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When Philip Kaufman set out to film *The Right Stuff*, he was faced with the task of creating believable flying effects — of familiar real-world aircraft and space vessels — that could be convincingly intercut with Air Force and NASA documentary footage. To accomplish the job, he engaged experimental filmmaker Jordan Belson and USFX effects supervisor Gary Gutierrez. What followed was a two-year odyssey of discovery and growth, during which all three found that high technology did not always produce high satisfaction. *Article by Adam Eisenberg.*

Brainstorm — Getting the Cookie at the End 26

More than a decade after *Silent Running*, effects maestro Douglas Trumbull landed his second directing assignment on *Brainstorm*, only to become embroiled in a debilitating two-year struggle just to see the film completed. A key element in the postproduction effort was the creation of a point-of-view representation of the death experience — an eerie journey through a figurative heaven and hell that dominates the film's climax. Trumbull, effects supervisor Alison Yerra and six other members of the crew, discuss the unique production. *Article by Brad Munson.*

Shadow and Substance 50

With *Twilight Zone — The Movie*, four top-notch directors joined forces to extract the essence of Rod Serling's ever-popular teleseries and transform it into a theatrical experience worthy of its progenitor — an anthology of filmic fantasies, old and new, ranging from the poignant to the harrowing. Though special effects, in general, were to take a back seat, two of the film's episodes featured exuberant displays of makeup prowess and postproduction opticals — discussed in detail by the principals involved. *Article by Don Shay and Paul Sammon.*

FRONT COVER — The fiery reentry of John Glenn's capsule in *The Right Stuff*.
A devilish gremlin on the rampage in *Twilight Zone — The Movie* — BACK COVER.

Low-Tech Effects The Right Stuff

article by
Adam Eisenberg

When Christopher Columbus set out to find a new route to China, he was doing more than just beginning a bold adventure — he was challenging tradition and superstitions. Told he would likely encounter horrible monsters of the deep, he chose to take the risk, and sailed off the edge of the known world into the uncertainty of an unknown horizon.

Like the man who discovered a new frontier, American test pilots after *World War II* found themselves facing an equally dangerous proposition. Seeking to surpass a different edge — the speed of sound — they were told their planes would disintegrate and be crushed by an unseen, impenetrable sonic wall. And indeed, this *was* the fate for many flying high above the barren Mojave Desert, until Chuck Yeager broke through the barrier in 1947. Conquering that demon in the sky, Yeager proved he belonged with men like Columbus — explorers who could challenge the unknown, beat the odds, and show the world they have “the right stuff.”

While perhaps not as dramatic, creating the visual effects for Philip Kaufman’s film version of *The Right Stuff* proved to be almost as difficult as discovering the New World or breaking through the sonic wall. Based on Tom Wolfe’s bestseller about Yeager and America’s first seven astronauts, the three-hour film demanded many astounding sequences, all with the same demon to conquer — reality.

Unlike the stellar adventures in *Star Wars* and its sequels, *The Right Stuff* was based on history and was to incorporate documentary footage of the actual events. From Yeager’s harrowing flights to John Glenn’s first orbit around the earth, this meant creating effects that could be blended with such real-life footage and appear just as true. It also meant a two-year struggle with tradition, a period in which the wonders of modern motion control technology would mostly be pushed aside for the sheer freedom and ruggedness of throwing model planes out windows, stringing them to helium balloons and filming them against a clear blue sky. It meant recreating history as realistically as possible, all for an effects budget that was one-quarter the size of that for *Return of the Jedi*.

Discovering the right approach to create the desired effects was a slow evolutionary process, the very beginnings of which start with Philip Kaufman. Director of the *Invasion of the Body Snatchers* remake, *The Wanderers*, *The White Dawn* and *The Great Northfield Minnesota Raid*, Kaufman is known as a filmmaker with a clear vision of what he wants to present. For *The Right Stuff*, he knew he needed special effects that were not only real-looking, but also had a sense of challenging a new frontier.



“*The Right Stuff* is a film about nature, man and the unknown,” he explained. “It is about men of strong character who set out to break records and ended up being the first to glimpse the heavens and outer space. But they did so with a new technology, and I wanted the effects to capture that ratshack quality that was involved, like when Yeager used the sawed-off top of a broomhandle to close the door of his X-1. The planes were always on the verge of falling apart, and we needed to express the sense of danger involved and capture that jerry-rigged quality that is part of American ingenuity.”

Uncomfortable with working in Hollywood, Kaufman convinced his producers and The Ladd Company to allow him to make his film from San Francisco. Establishing offices in an old, redbricked warehouse that was once a part of the American Can Company, he decided to avoid the more traditional approach of hiring an established effects house, choosing instead to pursue a different tack. First, he asked experimental filmmaker Jordan Belson to provide some unique images of the earth from space and other more surrealistic concepts to heighten the dramatic tension of certain sequences. Second, and for the majority of the effects, he hired Gary Gutierrez and the newly-formed USFX.

The Right Stuff opens with the events leading up to Chuck Yeager’s barrier-breaking flight in the X-1 rocket plane. When another pilot surpasses his record in a new X-1A, Yeager takes the improved craft up and attains an unprecedented speed of Mach 2.5 before nearly losing his life when the plane plunges into an uncontrollable spin. With the dawn of the space program, however, America’s once-fabled test pilots begin to be eclipsed by the Mercury astronauts and their initial steps into the final frontier. The film dwells, in particular, on John Glenn’s historic flight — as he becomes the first American in orbit, but then nearly burns up while reentering the earth’s atmosphere. Finally, the focus returns to Yeager as he makes an unauthorized attempt to top the previous high-altitude record for a piloted craft. A malfunction in his NF-104 forces an aborted bailout, which leaves the veteran flyer badly burned when the ejection seat and rocket become tangled in his parachute lines. He survives the ordeal; but in its own way, the episode heralds the close of a dramatic chapter in aviation history.

“When we started planning our effects, ILM was booked up with *E.T.*, *Star Trek II* and *Poltergeist*,” Kaufman recalled. “We made some inquiries there and at a lot of Los Angeles special effects houses — several of which put in bids that seemed high. I was also feeling the need to have everyone close to me. It would have been a disaster to have had a studio down in L.A. where I wouldn’t be able to see the results every day. I knew Gary hadn’t really done anything of this scope before, but my instinct was that he could do it.”

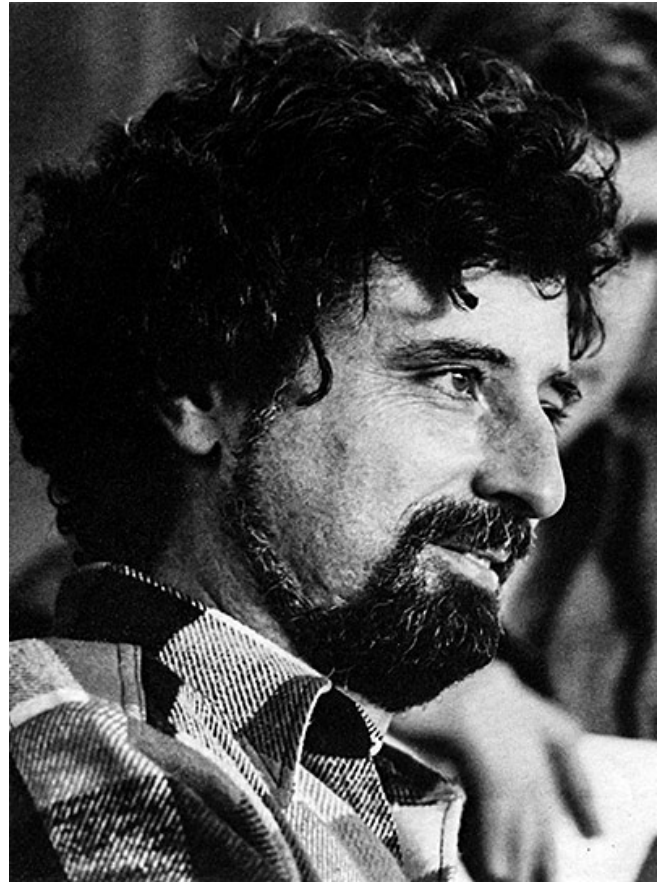
Gutierrez was originally hired by Kaufman to draw storyboards for the film. An artist and animator, he was a student at the San Francisco Art Institute in the early 1970’s when he got his first professional experience working for John Korty Films. There he did animation for a variety of projects including *Sesame Street* and *Electric Company* short subjects, as well as an independent project to produce animation for the title sequence to *The Grateful Dead Movie*. When Korty was unable to provide a second season of shorts for a children’s series called *Vegetable Soup* due to other commitments, he suggested Gutierrez and fellow assistant Drew Takahashi for the job.

Together, the two formed Colossal Pictures, creating a national logo for the San Francisco PBS affiliate and animation for local radio station commercials, before eventually working their way up to national accounts such as Levi's Youthwear and Boise Cascade. Prior to *The Right Stuff*, Gutierrez independently story-boarded the racing and riding sequences for Carroll Ballard's *The Black Stallion*; and then, with Colossal, created *The Black Stallion* title sequence, plus the pre-title sequence for Francis Ford Coppola's *One from the Heart*. When Kaufman was making inquiries regarding special effects, he asked Gutierrez and Colossal to put in their own bid — and they won the picture.

USFX, created by Colossal for *The Right Stuff*, was hired on and established in September 1981, and the long odyssey involved in creating the effects officially began. Gutierrez, who — along with Tim Boxell — had already done production boards of the entire film as part of a presentation to The Ladd Company, now began work on boarding the effects sequences in detail. In addition to Yeager's historic flight in the X-1, USFX was also responsible for his near fatal follow-up in the X-1A, his equally dangerous flight in an NF-104 and John Glenn's orbit around the earth. More than two thousand storyboards were eventually completed, although as the production evolved, they became less and less important to the actual look of the USFX footage.

This early period was a time spent doing research and studying old films which Kaufman hoped would help convey his ideas concerning the effects. "We looked at probably thirty to forty different films and watched flying sequences in 16mm and on videotape," Gutierrez recalled. "Among the feature films we studied were *Flying Tigers*, David Lean's *Breaking the Sound Barrier* and Howard Hughes' *Jet Pilot*. We got a 35mm print of *Jet Pilot*, in particular, because it was the last time the real X-1 was flown. Chuck Yeager actually flew it in the film. It portrayed a Russian experimental aircraft that John Wayne had to hijack, not unlike *Firefox*. Overall, it was a pretty silly movie, but it had some pretty good flying sequences, most of which involved real aircraft."

In addition to Hollywood features, the effects team viewed a lot of NASA footage, material available to the public but never shown on television. "There was one film that documented Glenn's entire flight — the one we were depicting. It was shot by a research camera mounted in the panel in front of him, and I believe it took one picture every second throughout his entire trip. Then later, each



In bringing *The Right Stuff* to the screen, writer-director Philip Kaufman found himself challenged, not only with the necessity of recreating near-history, but also of producing effects footage of familiar aircraft and space capsules that could intercut convincingly with authentic documentary film culled from Air Force and NASA sources. To this end, he engaged experimental filmmaker Jordan Belson and the San Francisco-based USFX facility under the direction of effects supervisor Gary Gutierrez. Together, they strove to recreate the heyday of America's flamboyant test pilots and the Mercury astronauts' first tentative steps into space.

frame was printed twenty-four times so the film would click at rhythmic intervals. Of course, the whole flight was documented, but we just saw key moments. Watching those early films was a good way to become immersed in the look of the period and to get some accurate information about how the cockpits looked and how pilots climbed into them. We also watched other films over and over to study how a tracking camera might follow a fast-moving plane. We'd try to nail down those characteristics we could emulate, like the slippage of the plane in the frame. Trying to follow and film a fast-moving object always causes slippage. Sometimes, the nose of the plane is cut off by the frame edge and sometimes the tail, depending on whether the chase plane is moving a bit ahead or behind the plane it's following. Phil's idea was to get that documentary, barely-keep-it-in-frame quality. He said that if United Airlines flew the friendly skies, he wanted to see unfriendly skies."

While the storyboards were nearing completion in the late fall, other aspects of USFX were preparing for production. Electronics engineer Zac Bogart, who had worked for Douglas Trumbull and had built some animation stands for Colossal Pictures, was hired to develop a motion control system for USFX. Bogart designed his system with as much versatility as he could, since at the time, no one was certain as to precisely how it would be used. Engineered to record and play back movements based on X-Y coordinates, Bogart's device featured a Fries Mitchell 35mm camera mounted on a boom arm, placed at right angles to a vertical shaft. This cross-shaped configuration was, in turn, positioned on a moving turntable that enabled the whole apparatus to swing around as it traveled down the track. Nicknamed the Cruciflex, the system allowed the camera to pan 360 degrees, roll 360 degrees three times, and pitch approximately 210 degrees.

At the same time, models were under construction. Pulling a mold from a NASA model of Glenn's Friendship 7 capsule, Frank Morelli constructed one made out of fiberglass, with movable panels and an armature inside for motion control. In addition to this "hero" capsule, which was approximately one-third the size of the real one, rough aluminum and plaster capsules were made for pyrotechnics used in simulating Glenn's reentry,

For the X-1 and X-1A, Mark Stetson fashioned carefully crafted models based on scale drawings done by one of the designers of the X-1 and an original wind tunnel model of the X-1A. Surface detail such as rivets and seams were etched into aluminum, finely fitted over a wooden fuselage. A mold was then made, from which fiberglass models could be cast. To add greater detail, scratches were etched into the finished paint around the entry hatch and then painted over again to give the look of a plane that had been flown many times before it broke the sound barrier. Ironically, Stetson later had to go back and tone down some of his most intricate work, when a full-size mockup built for the live-action failed to duplicate his attention to detail. Three sizes of the X-1 and X-1A were built, ranging from seven inches to four feet in length. The largest, designed for motion control, had four armature mounts built in — one at the head and tail, and one on either side. Other principal aircraft featured in the film — the NF-104 and B-29 — were represented by modified, store-bought model kits.

Kaufman began first unit photography in March 1982, with locations set in the San Francisco area and at Edwards Air Force Base in Southern California. As USFX prepared to initiate its own production as scheduled, it became clear that while there had been a lot of discussion regarding how the effects should look, no concrete plan of attack had been formulated, especially for the flight sequences. "One of the bywords of that period was 'experimentation,' " explained Whitney

Green, USFX production manager. “We all felt that because we were dealing with atmospherics as opposed to space, that a lot of what the Lucasfilm people had done with tremendous success just wouldn’t work for us. We had an inherent distrust for bluescreen; but then, on the other hand, it became a question of: ‘Well, now what?’ ”

Work began on the Glenn sequence. With the Cruciflex camera head still under construction, cameraman Michael Lawler rented a motion control camera and some track from Richard Edlund and used the Cruciflex main assembly for a model mover. With this makeshift system, Lawler shot several held-take, latent image bipack composites of the capsule to experiment with possible matting techniques.

At the same time, tests were being conducted with pyrotechnics to see how Glenn’s fiery reentry could be recreated. “We tested various kinds of pyrogoop supplied by Thaine Morris and Dave Pier of MP Associates,” Gutierrez recalled. “It was a solidifying mixture with different granularities of magnesium and titanium. Cast into disc-shaped forms, we then stuck them onto the bottom of a roughly-made metal capsule shape pop-riveted together. Then we electrically ignited them and filmed on stage at numerous frame rates, with fans blowing the pyro material back. It looked promising, but uncontrollable. We had lots of problems, and after each test we had to waste a lot of time just airing out the studio.”

Lawler and technical researcher Gary Platek began experimenting with liquid carbon dioxide and liquid nitrogen. The nitrogen approach seemed the most successful, and they developed a way to direct its flow by taking drinking straws and packing them into cardboard cylinders which were then placed directly in front of the fans. When lines of nitrogen were hooked up behind the cylinders, but in front of the fans, the result was a directional flow of gas that would stay together for up to fifteen feet. When the nitrogen was lit with orange filters and directed toward the capsule’s heatshield, it created the illusion of fire on the shield. The results were promising, but they remained experimental and unrefined.

Other ideas and tests were conducted, but for the most part, nothing satisfactory emerged. In fact, during the first three months, only Lawler’s Glenn capsule bipacks were producing completed or semi-completed images, all done with motion control. Meanwhile, Kaufman found himself engrossed in production and constantly out of touch. With communication particularly strained during the Edwards shooting, problems began to arise. The most serious was Kaufman’s dissatisfaction with the motion control look.

“Gary started gearing up for the special effects by doing what he was supposed to do,” said Kaufman, “hire the best people in the field. That was his first mistake. Sometimes you can listen to professionals to the point where you lose any artistry in what you’re doing, because they have certain methods that constitute the way they do things. Gary’s instincts are much more like mine, but he had become trapped in the state of the art. I was always wary about motion control for this picture because there couldn’t be a sense of ‘knownness’ about the film, which is what motion control ultimately gives you. The work done by Lucas-film and ILM is the best that can be done; but even so, the ships always have a certain lightness about them, a bounce when they start up. That look is appropriate for fantasy films, but real planes have a sense of weight. They just don’t act that way.”

As communication continued to be difficult because of the problems Kaufman was facing with the live-action photography, tensions started to mount. “It was a tough time,” Green recalled. “We were pushing as hard as we could, but we weren’t producing enough. At that point we had lost Phil for about six weeks. He was working sixteen hour days and we would send him our little tiny ribbons of film and hope he’d have time to comment on them. We were caught in the middle of a maelstrom. Our early John Glenn space shots were magnificent. They were very stately and on the level of 2001. But Phil decided — and I think ultimately rightly so — that it was the wrong kind of look. He wanted a gritty feel, and our early stuff was too majestic.”

Finally, on one of Gutierrez’ visits to the set, he and Kaufman had it out. “It was a Sunday morning in the desert, and we had a real showdown,” Kaufman explained. “At that time they must have had between twenty-five and forty people working for them to kind of service the beast of the machine, and it was just too premature for that. It was getting into a bigger structure than we wanted; so it was decided that until I came back, they would shut down.”

Black Sunday, as the day would become known around USFX, proved to be an important moment for the effects facility because it would mean a reorientation of direction. Even so, for those involved at the time, it was a difficult moment. “Gary and I went down to Edwards and met with Bob Chartoff and Paul Mazlansky of The Ladd Company,” said Whitney Green. “We sat down and I began reading off a continuation of grim numbers which got grimmer and grimmer as I went along. The budget was creeping up and what they weren’t getting was results. It’s great to have the numbers go up if we had pretty pictures coming in. In our case it was ironic, because they were too pretty. It was tough going back to a crew that had worked so hard, but I think everyone understood. We were all frustrated.”

For Gutierrez, the move to shut down full production came as a relief. He too was feeling frustrated by the slow progress they were making. “I remember flying back and suddenly finding myself in a revelation about what it was we should be doing. Before I left Phil, he really stimulated me and challenged me to lose as many preconceptions as I could, to start listening to my own reflexes and to ignore what had become a classical motion control approach. I found myself thinking of all sorts of possibilities that I had wanted to try before but had been talked out of. I felt free now to try them, because Phil trusted me enough to encourage me to be crazy. He stressed that on a number of occasions.”

image

Effects cameraman John Fante adjusts a pylon mount in preparation for a bluescreen test shot on an NF-104. Ultimately, the traveling matte technique was abandoned altogether — at least for the aircraft — in favor of a more realistic-looking live-action approach.

image

Among the unorthodox alternatives employed was tossing model aircraft out the third-floor window of the USFX facility while cameras recorded the free-fall action. Here, an NF-104 is being dropped onto a large canvas-covered platform painted to simulate desert terrain. Foggers create atmosphere effects.

image

More conventional flight footage was obtained on the USFX stages, employing matte-free single-pass photography of model aircraft against painted backdrops.

USFX entered into its hiatus period, a time when the staff was trimmed down and several veterans chose to move on to other projects. Production coordinator Richard Kerrigan stepped up to production manager when Whitney Green became unavailable. Mike Lawler also decided to pursue other film assignments, and assistant cameraman John Fante was bumped up to replace him. With his crew reduced to one cameraman, one assistant, one stage technician, a couple of runners, one secretary and an editor, Gutierrez felt free to experiment and try ideas that had seemed crazy before. Among the first things he did was to have a large X-1 cast in rigid foam that could be used without concern for its welfare. He also had an eighty-foot camera dolly track built and placed diagonally in the main studio.

The first experiments involved suspending the plane models in a variety of different ways to create a sense of free-floating, eccentric movement. Sometimes they were hung from the ceiling by bunjy cords; other times, more elaborate counterweighted rigs were employed. The models, in turn, were filmed using a hand-held Eyemo camera provided by John Fante. The Eyemo, a small 35mm unit used as a gunsight aiming point camera during *World War II*, is today used primarily as a crash camera. Shaped like a football, the sturdily-crafted Eyemo is very easy to twirl and rock back and forth. With his Eyemo in hand, Fante tried a variety of unconventional approaches, such as riding a wheelchair past the models at different speeds — even running past them sometimes, spinning the camera to create a disorienting effect.

Through the use of Rapid Access and Recovery (RAR) black-and-white negative film, which could be developed in fifteen minutes, Gutierrez was able to evaluate the experimental footage quickly.

“Basically we tried to nail down what kinds of moves looked right. The key to working with Kaufman proved to be the RAR film. It helped give him the hands-on approach he wanted, and it also enabled him to quickly evaluate what we were doing. Also, the RAR gave us an immediate way to see what our final image might look like, because on that negative stock, the planes appeared black against a clear background. As a result, we could easily bipack them with aerial backgrounds. We had spent a lot of time on refined shots that didn’t work. Now, we were getting shots that had the right feel. And because they were in this ‘sketch’ form, we felt freer to be loose with them.

“We did some experiments with suspending an NF-104 from helium balloons and floating it around the studio. The approach looked promising, but after a few days we didn’t pursue it further. Eventually we would go back to it almost a year later, but for the moment we let it go. I also took an NF-104 up on the roof of our building and hung it from a little trolley-like assembly that could run down a taut wire. We went up on the roof so we’d have the freedom of looking out at the horizon. In another test — just to see what it would look like — I filmed an NF-104 against black velvet in bright light, panning it through the frame. Then I went outside and double-exposed the image over a pan across the blue sky past the sun. Both experiments were promising and led to other ideas.”

In addition to his own tests, Gutierrez also explored briefly the negative bluescreen approach Apogee had used to create their effects for *Firefox*, “We tried it more out of curiosity than anything else, and found it would have taken much more testing and control than we felt we had time for. We were looking for techniques we could use for a lot of different sequences; and since Phil didn’t like the motion control look, we felt it wouldn’t work for us.”

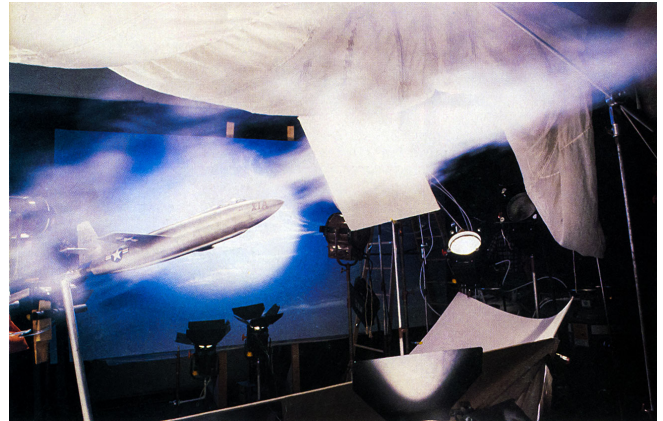
First unit photography officially wrapped on June 12; and after two weeks to rest up, Kaufman returned to his San Francisco offices to engage in postproduction and pursue the effects problems. He was pleased with some of the RAR footage, but was determined to open up the USFX approach even more. Together with Jordan Belson, cinematographer Caleb Deschanel and production designer Geoffrey Kirkland, he went across the street to the USFX studio to give the motion control system a run-through and see exactly what was possible.

“What we had been seeing wasn’t right and we were trying to come up with ways to correct this,” explained Kaufman. “We wanted to see if the basic approach was viable for us at all. Caleb spent more time there than I, trying to do some more erratic moves with motion control and take bigger chances. In particular, he tried to pattern some moves for the X-1. But I was never happy with what I was seeing. It just didn’t look real. With motion control, the only way we could get anything at all was to program in the most elaborate kinds of moves, and that just took forever. I felt what we really needed was a more live-action approach. There was still struggling after that week, but basically, we began to push more and more into what became a total abandonment of motion control for the flying sequences.”

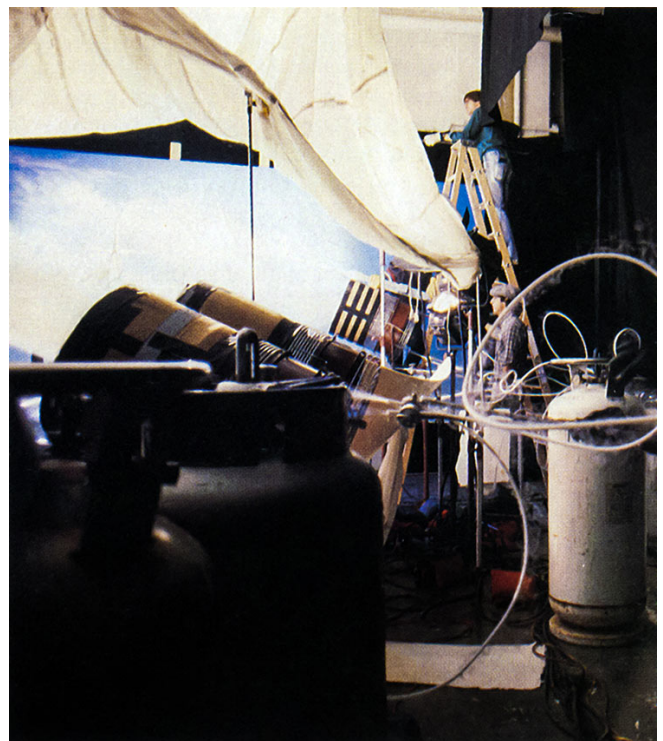
Gutierrez continued to experiment with the RAR stock because it allowed him to film tests quickly and get feedback from Kaufman without long delays. It also gave the editorial department rough footage they could cut into the film. Of all the tests conducted during the hiatus period, the footage created by having Fante run at or away from the models seemed to show the most promise. For Gutierrez, this was a positive direction in which to move. “An idea may not work,” he stated, “but something about the experiment might give you a new idea or suggest a new direction to take. The hiatus period really gave me a chance to just experiment and realize that all that’s important is



Chuck Yeager's X-1 A on its record-breaking Mach 2.5 speed run.



The tail-mounted X-1 A, positioned in front of a Jena Holman background painting, was filmed with various techniques — including hand-held — in an attempt to replicate the kind of catch-it-on-the-run look characteristic of true documentary flight photography.



whether the idea works or not, no matter how insane that idea might sound.”

To heighten the sense of depth and speed, liquid nitrogen was employed to create trailing cloud formations. Off-camera, large cylinders filled with drinking straws were mounted in front of fans which sucked the vaporized nitrogen in from behind and directed it out past the models in a linear, nonturbulent stream.

The hiatus period, which lasted approximately six weeks, wound down as Kaufman began doing rear projection process photography in August at nearby Hamilton Air Force Base. Occupying an abandoned hangar, the film crew set up various cockpit and capsule interior mockups; and USFX, in turn, spent three to four weeks providing background plates for the Alan Shepard, John Glenn and Gordon Cooper astronaut sequences, and for Yeager’s flying scenes. Among the effects required were the flames for Glenn’s reentry.

“We had to blend our fire effects, which were basically orange-lit nitrogen, with some done by Jordan Belson,” Gutierrez noted. “His had more of a light quality to them instead of a look of flame, and together they created an interesting veil of fire in the background. We also did some pyrotechnic effects, starting with just sparks flying by his window and ending with full-blown chunks of retropack. We used a little of everything, including pieces of magnesium and other metals provided by Dave Pier.”

Another effect created for rear projection featured a moonrise as seen from space. Recreated from NASA photographs, the image was generated primarily by USFX art director, Jena Holman. Its most taxing aspect lay in duplicating the apparent flattening of the moon as it dropped below the earth’s horizon. “We tried a variety of approaches,” Holman explained, “and what we eventually did was start with a glass painting of the edge of the earth’s atmosphere, so close in front of the camera that it looks very soft because it’s just missed the depth of field. Then we cemented a cutout photo of the moon to a black velvet background, with the bottom of the velvet stretched around and under a cylindrical roller. As the shot was being filmed, we slowly tilted the camera up past the foreground ‘atmosphere.’ At the same time, we slowly pulled the velvet with the cutout moon under the roller, warping the perspective of the flat photo —just as in the NASA photograph.”

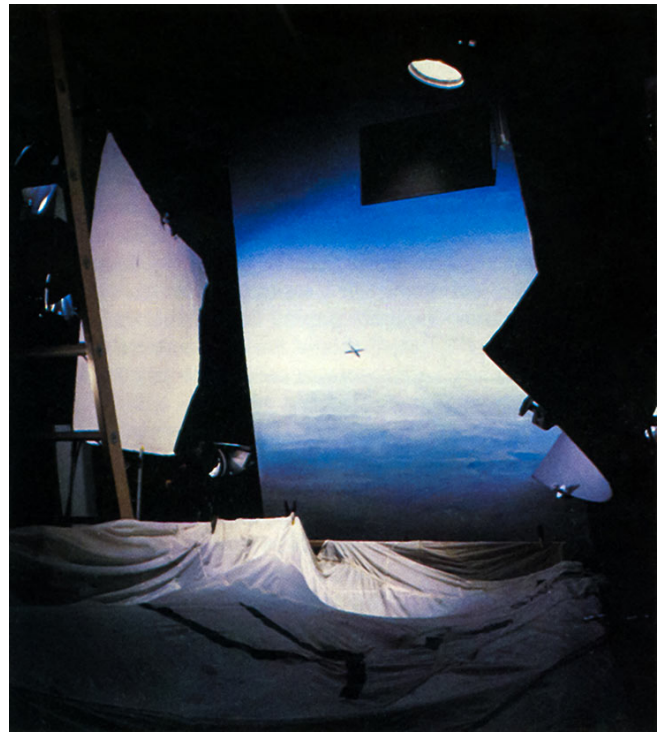
The rear projection process work proved to be a good way for USFX to begin gearing up again. But it was not until that was completed that Gutierrez and his staff could return to their flight simulation and reentry problems. Now the period of true experimentation would begin. Just as Yeager had expanded the limits of atmospheric speed by punching through the envelope known as the sound barrier, USFX began testing the envelope of accepted effects techniques, learning in the process — as Kaufman had suggested many times — to “be crazy.”

As he had done almost nine months before, Gutierrez decided to start back working on the Glenn reentry, trying to film closeups of the capsule as its retropack and heatshield begin heating up and the retropack starts to break apart. Once again, liquid nitrogen became a valuable tool — although, as cameraman John Fante admitted, setting up the shots was often not easy. “Rigging was the most time-consuming. The reentry involved setting up a half-silver mirror in front of the camera to illuminate Scotchlite reflective material applied to the bottom of the capsule; setting up cans of sterno in front of the camera — but out of frame — to help create a heat distortion effect; and rigging the liquid nitrogen.” During the shot, nitrogen was pumped out through the rim of the capsule and through the porous material from which the retropack was carved. Then the straw-

packed fans blasted the frozen gas back toward the nose to create a comet tail effect around the spacecraft.

“We spent days trying to create what would ultimately be two-to three-second cuts. A lot of it produced dead ends, and most of our time was spent in research and development, essentially trying anything and everything. Sometimes we’d run into an old technique that we’d tried earlier, and sometimes we’d throw out an approach and start off in a new direction.”

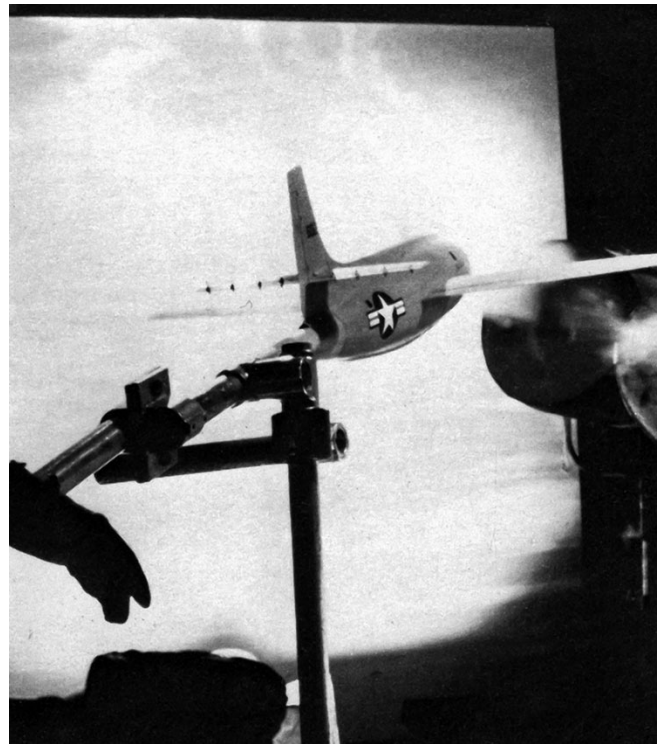
Such experimentation resulted in some very successful shots that Kaufman accepted readily, but the answers didn’t come quickly. In fact, many unusual dead ends had to be faced first. “Some of our attempts included covering the base of the capsule in Scotchfoam, and then trying to bleed nitrogen through the foam so it would look like it was burning off in orange fill light. It didn’t. Another attempt involved putting shaving cream on the foam and blowing that off with compressed air. I don’t think that ever looked like anything but shaving cream being blown off with compressed air.”



For a long shot of its recovery from a spinning fall towards earth, a six-inch X-1 A was suspended on wires and “puppeteered” through a sweeping arc while the background painting was rotated 45 degrees and panned by.



Liquid nitrogen clouds flow behind the X-1 A as stagehand Peter Hadres imparts some roll to the model during a shot.



The history-making X-1, on a manually operated mount capable of providing limited yaw, pitch and roll.

Model shop supervisor Earle Murphy recalled a few other considered alternatives: “One actually involved casting a heat-shield and retropack in mercury and keeping them frozen in liquid nitrogen. Then, they would slowly be brought back up to room temperature in front of fans. The idea was that the mercury would melt and go back to its liquid form and — under the right light — look like metal melting away. At that time, we didn’t have a mold that could handle it, but we did consider the idea. We figured we’d need forty to fifty pounds of mercury. We didn’t get as far along as considering that mercury is hard to control, not to mention very toxic. One mold we did have ready was for ice, ice cream or jello, any substance that might fall apart on film and disintegrate like a real retropack would.”

“I didn’t have anything to do with the mercury or the jello ideas,” Gutierrez declared with a smile, “but we did talk about doing the retropack in ice and then lighting it with orange filters and time-lapsing its melting. We really didn’t pursue that very far. Actually, as our work progressed, we started to get a lot of strange ideas. That’s the true danger of thinking crazy thoughts — you don’t know when you’re going over the edge.”

Of all the techniques, liquid nitrogen and orange-gel lighting proved the most useful, although it was experimented with in many different ways. The nitrogen came in low- and high-pressure tanks that made it more directional than dry ice or any other steam-like possibilities. Unfortunately, though, it also froze most materials being used and caused them to break. Casting capsules out of plaster seemed to be the most successful answer; but even then, if other materials were attached to the plaster, they would tend to contract and freeze at different rates and pull apart. But regardless of the problems, liquid nitrogen was an important key in the Glenn reentry closeups, and was to prove equally as helpful in creating clouds for some of the airplane closeups.

After considerable experimentation with various wire rigs, Gutierrez developed a way of filming the planes in-studio that produced the live-action look Kaufman wanted. It was a method that would involve liquid nitrogen, painted backgrounds and camera movements similar to some tests done during the hiatus. In effect, it was a method involving all of the ideas they had discovered over the previous months.

“We had the X-1 positioned in a dramatic angle with a bright 10K sun source on it,” Gutierrez explained. “We then had banks of six to eight fans lined up and aimed toward the nose of the plane, with several people operating those with pieces of card to turn the flow on and off. Using the



In a scene deleted from the film, Yeager attempts to counter his aircraft’s uncontrollable spin by deploying his drag chute. Cameraman Rick Fichter grabs the shot with a hand-held Eyemo.



Fans direct nitrogen clouds past a tail-mounted X-1 A, encircled with parachute silk to provide an ambient bounce fill light representative of a cloud-filled sky.

drinking straw and cylinder trick that Mike Lawler and Gary Platek had developed for us to create a clean, linear, nonturbulent flow of nitrogen, we found we could interrupt that flow and create puffs of clouds that would flow through the shot in an adhesive stream and then fade out. This helped create the illusion of the plane moving in and out of clouds with a great sense of speed. We also learned to position the nitrogen so it could flow between the camera and the plane, interrupting our view from time to time. Sometimes we'd also have a thick veil two or three feet in front of the camera, or point the nitrogen at a card held at a 45-degree angle and make the gas fan off from the card in a thin veil two or three feet wide. That would be aligned with the apparent trajectory of the airplane to give a sense of disturbed air between the camera and the plane. All of the nitrogen was backlit to appear bright and white."

While the plane was apparently moving through this sky filled with clouds, Jena Holman's background painting would also be in motion. "Usually, the background painting would be of a large gradation of sky," Gutierrez continued. "In some cases, we'd use chalk to paint on distant clouds. Chalk was great because we could easily erase it with a damp cloth and quickly change the background clouds. The painting was on rails so it could move laterally and not give away the distance between it and the model. If a cloud that's supposed to be thirty miles away moves very quickly, relative to the plane, then you know something is wrong. To compensate for this, we would sometimes move the background with the camera so the distant clouds wouldn't appear to move at all. To add more realism, we would have someone control the plane's pitch, yaw and roll from below; and the camera was often hand-held to give a chase plane's point of view."

To capture the sense of a plane buffeting and vibrating as it approaches the sonic wall, the USFX cameramen first tried to jiggle the camera by hand but found that too difficult. "My muscles were getting quite a workout from trying to vibrate the camera in the desired way," said Rick Fichter, who joined USFX after the rear projection process work. "We had tried a motor but it was too uncontrollable. Also we were looking for a finer vibration. One day, Gary bought a Panasonic variable-speed massager. Everyone started laughing and telling jokes about it — and then of course wanted to try it. Eventually, we attached it to the tele-photo lens and used a rheostat to refine the movement."

In addition to the buffeting X-1, USFX also had to supply close-ups of the X-1A going out of control and dropping in an erratic spin after Yeager hits Mach 2.5. Once again, nitrogen and moving



An elaborate setup was employed to record the initial X-1 launch as it drops away from a B-29 mothership. Though the actual drop was photographed high-speed in the street behind USFX, the shot immediately following it was relegated to the stage. Forcing the perspective, a small B-29 was mounted in front of a painted backdrop, with a larger-scale X-1 positioned closer to the camera. Then, to duplicate a chase plane's point-of-view, the scene was photographed through a full-size aircraft canopy that had been used earlier for inserts. Liquid nitrogen clouds completed the illusion. A similar approach was employed for a pre-drop shot by using a properly scaled X-1 affixed to the B-29.

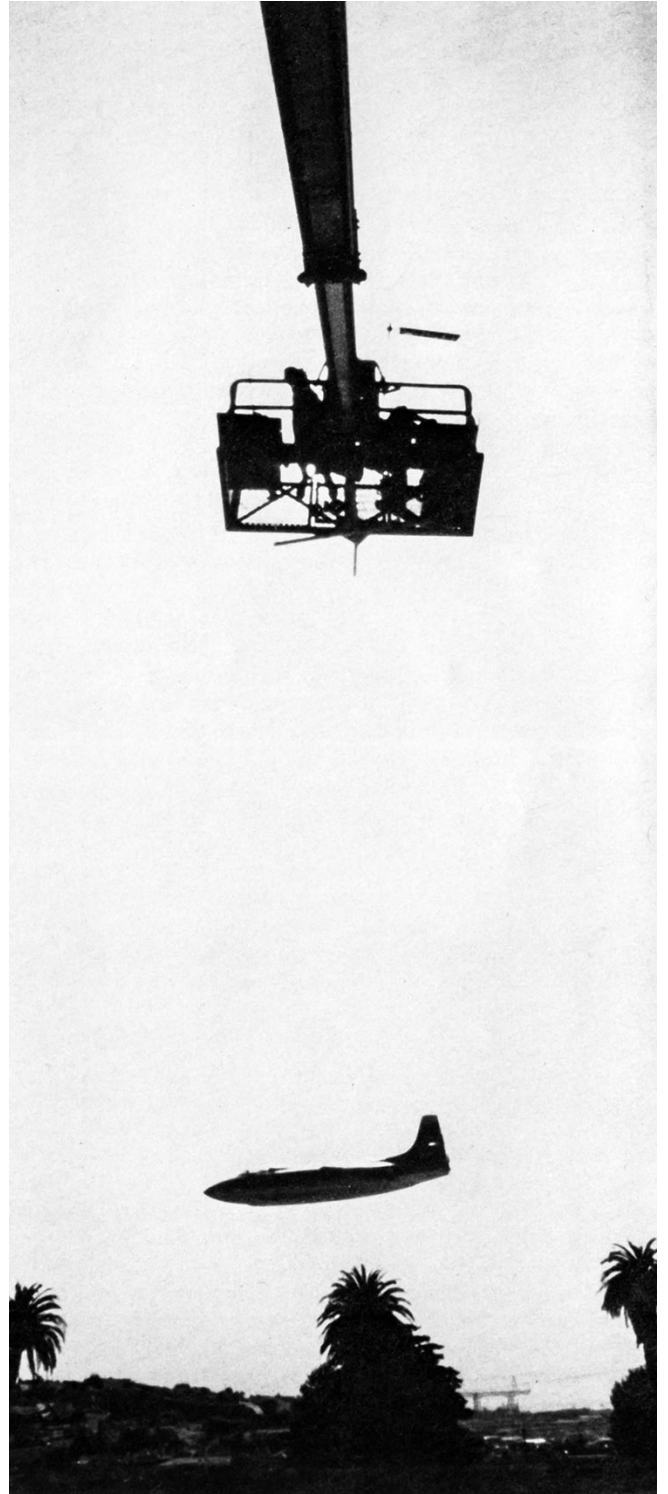
paintings were used, but now the degree of movement had to be significantly increased. The paintings, for instance, were now placed on a rig that allowed them to be spun a full 360 degrees. At the same time, the model gained even more motion by being placed on a jerry-rigged device USFX called the Bronco Mount. Named after the bucking barrel in *Urban Cowboy*, the Bronco Mount was a small cage in which an assistant could sit below the model and control the yaw, pitch and roll while the whole mount could be spun around. To add even more disequilibrium, Rick Fichter brought in an Eyemo he had modified with an electronically controlled motor. “Essentially, I would roll the camera in my hand while also keeping my eye to it,” he explained. “Sometimes we’d put a 50-300mm Nikon zoom on it and zoom out at the same time the background was twirling, the model was twirling, the camera was twirling, and the liquid nitrogen was streaming through in a straight line to give some sense of a frame of reference. We got some incredibly active falling shots that we spent a lot of time on because they looked so out of control.”

Not all of the studio-generated shots were so apparently haphazard. One, in particular, showed the X-1 dropping from a mothership B-29. “The shot was an attempt to duplicate a chase plane’s point of view that we’d seen in some documentary footage,” said Gutierrez. “To do it, we took the canopy of the full-scale X-1 cockpit — which we had used for inserts — and set it sideways on grip stands so we could look at the view from inside the canopy. We also placed a helmet inside, and moved it around during the takes so it would create reflections on the canopy glass and suggest the cameraman was trying to follow the action. Then, using liquid nitrogen blowing through to create a layer of clouds, we had the large X-1 in middleground and a small B-29 behind it to give a forced perspective, and a painting in the background that had a slightly backwards drift to it. The technique worked nicely for two shots that were in the cut, one with the X-1 still attached to the B-29 — the small X-1 model for this take — and one just after it’s dropped, but before its engines ignite.”

Most of the airplane models shot in-studio were filmed in telephoto instead of the usual wide angle. “One usually shoots models with a wider lens to give them a bigger look,” noted Gutierrez, “but we realized that even a 35mm lens ten feet away creates a sense of too much presence. Based on research films we saw, it’s hard for a chase plane to get that close to the other plane; and so filming wide angle just didn’t ring true. Even if the audience didn’t know exactly what was wrong in the shots, we knew they’d detect something. The telephoto lens gave us a greater sense of atmosphere. When we also used sterno to help disturb the air in between the camera and the models, and heavy fog filters, we found we got a look similar to what we saw in actual aerial photography.”

Though the closeups of the capsule and the airplanes shot in the studio were mostly successful, Kaufman still felt there was something missing. His push in a new direction resulted in USFX taking another giant step in the evolution of the effects. “We had done a lot of successful stage work that had been real encouraging to Phil,” Gutierrez recalled. “But the editorial side kept asking for longer and wider shots. We were working on the reentry and the flying sequences and having the same problem with both. While the closeups were working nicely within their limited contexts, when we tried to do wider shots the same way, they ended up looking stiff and unnatural. In particular, on Glenn’s reentry we couldn’t get the scope and uncontrolled look we needed in-studio. We looked at some NASA footage shot by a radar tracking camera of actual reentries from the Mercury program and later missions. The capsules always looked like they were part of a fireworks display, and their

fiery tails would sputter and sizzle. As we watched, Phil kept asking; ‘Can’t we get something like that — something that looks wild, like anything might happen at any time?’“



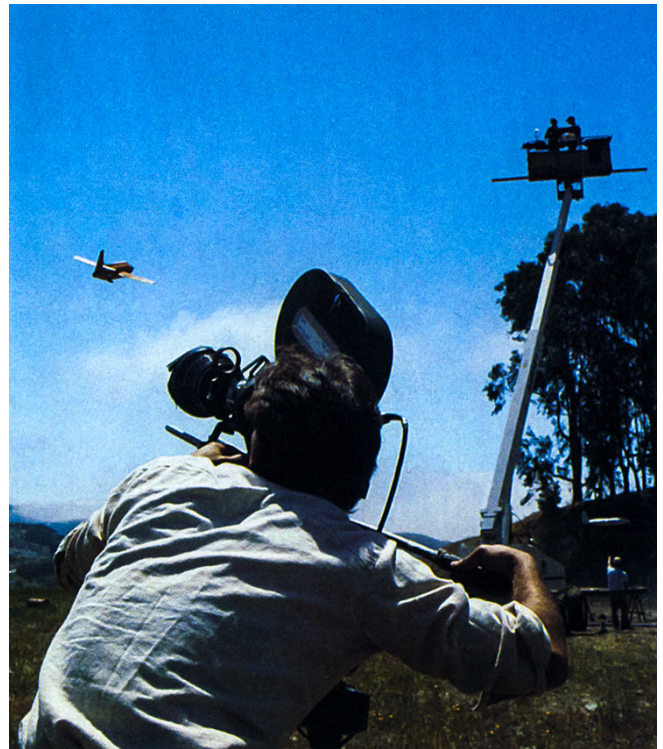
Much of the flight footage was filmed outdoors on an unobstructed hilltop overlooking San Francisco Bay. For some scenes, a manlift was used to suspend the models, swung on wires in pendulum fashion and photographed from below.

That night, Gutierrez remembered the pyro tests done during the very first months of experimentation, and with Rick Fichter, decided to try a new test. “We had some leftover pyro molded material,” he explained, “and we attached it to a small one-foot capsule that we’d used for discussions. We just hooked it on with a nail, hung the capsule on the end of a stick, lit it with a sparkler and dropped it out the third floor window.” Shot at high speed, the results of this offbeat experiment paved the way for creating convincing live-action images, once and for all free from the threat of motion control. “When Phil saw the test footage the next day, he was ecstatic. For the first time, the capsule had a sense of eccentricity and danger that he wanted. Ultimately, we did the reentry the same way, only under more controlled conditions that would prevent the capsule from literally tumbling as it fell. We shot it in a parking lot downtown one night, and had an aluminum capsule hooked up to a wire that ran from a cherry-picker eighty feet up in the air to a point down on the ground, a distance of a hundred feet. Dave Pier and Thaine Morris provided a more refined pyrotechnic mixture, and we shot it from a variety of different angles and at different speeds. Even so, on the day of the discovery, we found an approach that opened up a whole new direction for us.”

Around the same time, Kaufman was pulling for a different look with the flight sequences as well. “I was feeling that even with the live-action nitrogen work, we weren’t getting any real scope. One night I was driving home from work and went up on a little freeway rise as I was heading toward downtown San Francisco. Suddenly, I noticed a vast skyscape overhead and saw a little plane moving across the vista. The next day Gary and his cameramen sat down with me and we started pulling out old films of airplanes flying that showed just how jagged and erratic flight can be; and we looked at films like *Breaking the Sound Barrier*. We realized we were missing that tremendous sense of scope, that sense



For other scenes, model planes were flown along wires running from the manlift to tether points on the ground. Heavy-duty FT boat foggers blanketed the area with realistic-looking cloud formations.



Shooting in reverse, cameraman Martin Rosenberg records the X-1 sliding down a wire from the manlift.



of a tiny, isolated plane with one lone pilot in all the vastness — traversing that great sky alone, trying to go and break the record. Motion control and in-studio work could never deal with that.”

Augmenting the PT boat fogger was a more portable insecticide fogger which proved particularly useful in shifting wind situations. As with the larger unit, mineral oil was employed to produce nontoxic, billowing white clouds.

Within one week after the capsule discovery,

Gutierrez expanded his experiment by tossing airplanes out the window as well. “Gary started by throwing out the NF-104 and the small X-1 and X-1A,” explained Rick Fichter, who was down below with a camera framed against the open sky. “He kept throwing them out and yelling down to me, asking how big they appeared in the frame. I told him they were awfully small, and that they kept going out of focus before I could get a large enough shot of them. The next thing I knew, Gary brought out the gigantic model of the X-1A and hung it out the window, asking, ‘Is this big enough?’ I thought: ‘He can’t be serious. He can’t be *that* crazy. If that model gets broken, we’re up the creek!’ ”

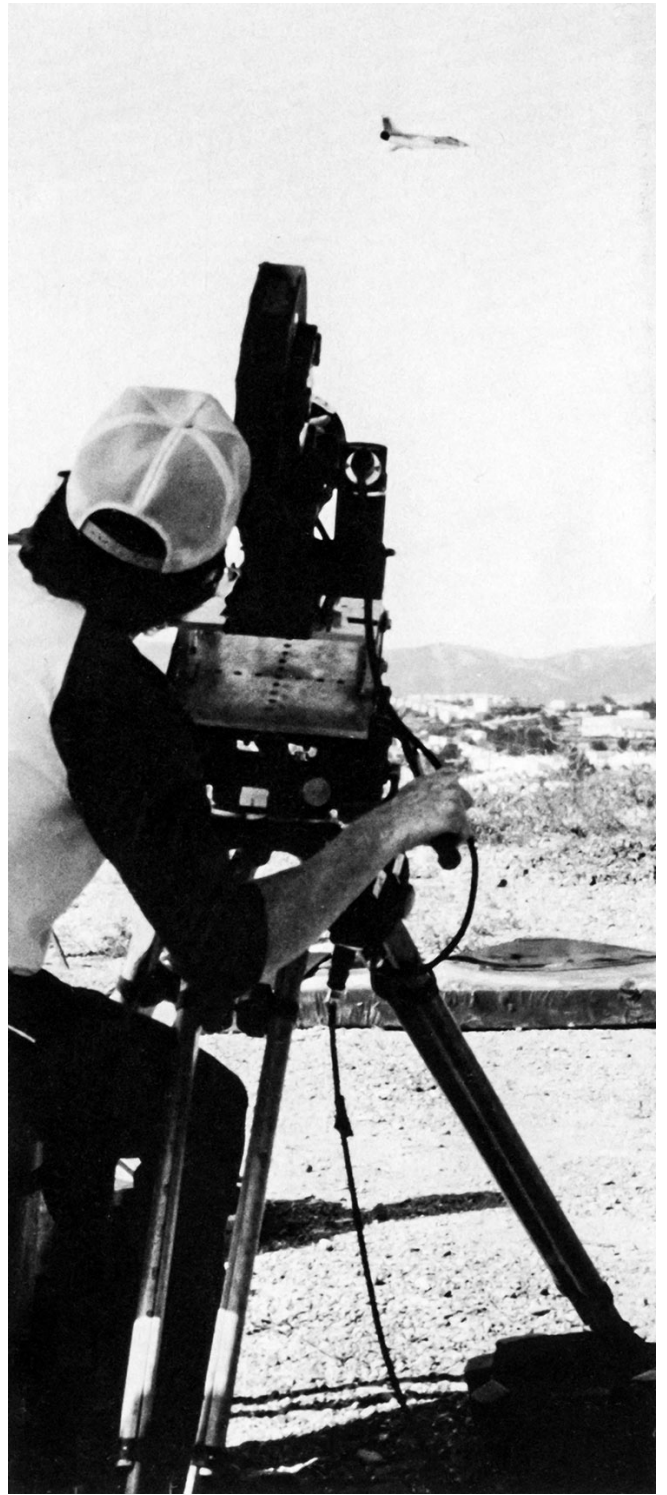
But Gutierrez *was* serious. “We had two large X-1A models, one heavily armatured for motion control and one foam-filled but carefully painted and detailed. I used the latter, which I had to sort of wedge out the window, it was so huge. We had smokers blowing smoke across between the camera and the falling plane to create a sense of atmosphere. And I threw it four times without breaking it. When Phil saw the footage he was just delighted. He finally saw something that had a sense of reality to it. I was thrilled, and it was one of the highpoints for me during the whole production. Both it and the Glenn reentry experiment were examples of when the crazy approach started to work. Phil was fascinated romantically with the idea that we could do something so low tech and it would work. From that point on, the amount of delight he got from the success of any shot was directly proportional to how funky the method that accomplished it.”



Gary Gutierrez directs his crew as an X-1 A swoops through the artificial clouds. Multiple cameras were used on most of the setups, usually running at different speeds.



Model shop supervisor Earle Murphy sets a model rocket motor into the engine port of a lightweight polyurethane X-1.



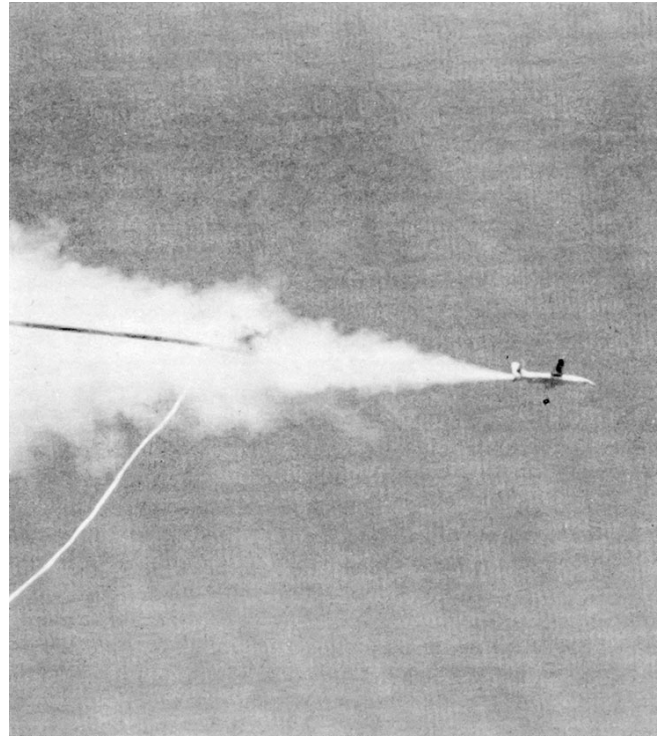
Cameraman John Fante photographs a highflying NF-104.

Once the principle was established, several techniques were developed to handle the different planes and their sequences. For instance, to show the X-1A in an uncontrollable spin down towards an uncompromising desert below, a model was dropped out of the window and filmed from above as it fell towards a huge forty-by-sixty foot painting done on canvas by Jena Holman. For sequences with the MF-104, Gutierrez wanted to film the models as they made an arc in the sky, so Fichter and grip Peter Hadres developed a large crossbow out of aluminum sliding rails and surgical tubing to launch them from the street.

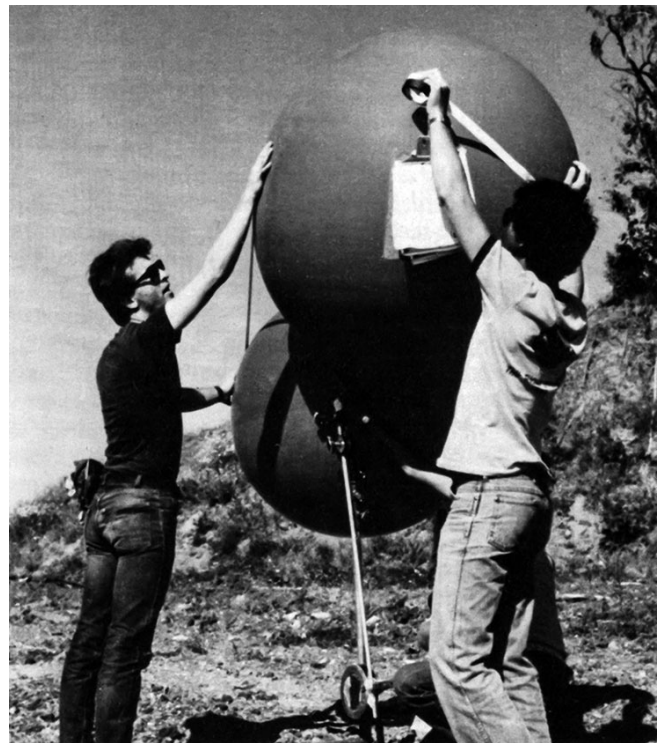
Caught in the middle of all the different techniques were the models themselves, which often had to withstand the most rigorous of beatings. "People around the studio felt sorry for me when the models got broken," Earle Murphy recalled. "Initially, I will admit that it was painful to watch them being forcefully thrown out the window and smashed on the ground, after we'd spent so much time on them. After a while, though, I got into the spirit of the thing, especially after I saw the dailies and realized how good the material was."

"We went through seventy or more kits of the MF-104," Gutierrez admitted. "We were filming out on the pavement and we'd fire the models off. Sometimes our guys would catch them and sometimes they wouldn't. They had a twenty-foot parachute to catch them like a fireman's net, but the models were light and the wind made them want to fly. We had a M.A.S.H. unit of sorts on the sidewalk to repair them with Hotstuff instant glue and baking soda. Fortunately, because they were small in the frame, the models didn't have to be too detailed. They were covered with aluminum foil to pick up the glints of blue light in the atmosphere, and then covered with some decals. When we got going full force, we were breaking them faster than they could be fixed."

Among the many shots done successfully on the street behind USFX was the dawn launch of the X-1



Model rocket motors propelled the wire-mounted aircraft in some shots, producing genuine thrust and appropriate exhaust effects.



Jan Heyneker and Gary Gutierrez prepare helium balloons to carry an NF-104 aloft on a fifty-foot wire. Cameras with telephoto lenses then tracked the vertical ascent for approximately a mile.

from a B-29. The latter was store-bought and modified to include a bomb bay hatch and battery-powered motors. Tests were conducted to determine the best frame rate to film the moving propellers, and the bomber was hung from a high roller grip stand that stood fifteen feet up in the air. Filmed during one late afternoon, the X-1 was placed underneath the B-29 and a little mechanical timer was set to pull the one pin holding the rocket plane in place.

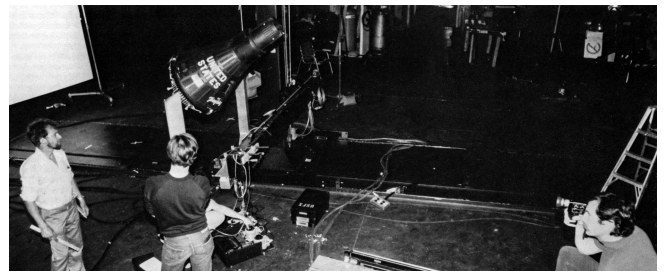
“We set it for twenty seconds,” Gutierrez said, “and someone would yell out the countdown with a stop watch. When they reached the ten-second mark, the cameraman would turn on his camera at 96 frames per second, we’d blow a little nitrogen through to get the atmosphere, and the camera would start down low and then move up and down to simulate the chase plane’s movement. At the right moment, the X-1 released and dropped straight down into a parachute net stretched below the frame. The shot’s very fast in the film, but it’s also very effective.”

“The wires are there,” Fichter commented, “but it’s a combination of the background clouds and our clouds, plus movement of the camera and the exposure, that tricks the eye into not seeing them. If you could examine a frame closely, you’d see wires; but you’d have to look real close.”

Despite the success of the footage shot on the street, there were still problems with scope. From the same third-floor window where Gutierrez had tossed out the first plane and capsules, he found the answer — a hill two miles away, located in the Bay View District and overlooking Candlestick Park. Called Hunter’s Point by many of the crew, it was the site of an old orphanage that had been torn down to make way for new condominiums. Since the new structures were yet to be started, the location proved to be the perfect solution.

“First we were living with the restraints of the stage,” Gutierrez noted. “Then, when we went outside, it was telephone wires, traffic and buildings. When we found the hill, we found a spot with very little obstruction down to the horizon, a place where we could use eighty-foot wires strung from a manlift and send models soaring on wires. Our original intention was to just get a few scope shots we couldn’t get elsewhere; but suddenly the hill presented us with all kinds of possibilities.”

The first footage taken at Hunter’s Point was of the NF-104, for a shot simulating Yeager’s near-vertical climb into the atmosphere during his attempt to top



Using the Cruciflex motion control system as a model mover, cameraman John Fante lines up a shot on the one-third-scale Friendship 7 capsule. In contrast to the frenetic quality Kaufman wanted for the aircraft footage, the Mercury capsule shots were obtained using more majestic-looking motion control moves.



Off-camera earthscapes were sometimes employed during bluescreen photography to cast appropriate reflections in the capsule window. Although most of the capsule shots

the altitude records in a piloted craft. The models were weighted in the tail and then strung to helium balloons — harking back to the experiments

were done as bluescreen composites, an occasional scene was able to be done without mattes, using painted backdrops.

Gutierrez had first conducted in-studio during the hiatus. The wires were coated with Gunblue, a substance which helped dull their shine and allowed them to blend better into the sky background. Other shots involved hanging the X-1 and X-1A from a manlift and using a dolly track to move past them with the camera. Smokers were employed to create clouds and atmosphere. But even though the location was right, there was still something missing. Fortunately, Thaine Morris and Dave Pier soon came up with the answer. “We brought in an old PT boat fogger,” Morris explained. “It was originally designed as a screening device back in World War II. It doesn’t work for boats today because of radar; but back then, they had two of them on the back of PT boats, and when they’d run into the Japanese fleet out in the South Pacific, they’d fire up their foggers, run around in the fleet and then run back out. After the fog cleared in about a half-hour, they’d see how many ships they’d sunk by having them run into each other. The fogger creates a really dense, white cloud with a visibility of about six inches.”

The fogger also created clouds that could go several hundred feet in the air and settle into formations resembling huge cumulo-nimbus clouds. While it could run on any number of different oils, mineral oil was used at Hunter’s Point because it was nontoxic and created a whiter cloud than most. Morris would periodically fire up the fogger for about forty-five seconds at a time, and then shut it off for several minutes. “If you left that sucker on for an hour, you wouldn’t be able to find San Francisco,” he quipped.

In addition to the PT boat fogger, several hand-held insecticide sprayers, filled with mineral oil, were used to create foreground clouds. “The combination of the big clouds, the scale of the models and the ability to send them on long distances really helped us get the scope and feel we needed,” Gutierrez explained. “We still had many problems to face, including the size of the wire and keeping it from showing. But by using a fog filter, we found we could hide them and also get rid of that sense of presence caused by being only ten feet away. Depending on the time of day, the fineness of the wire and the angle from which we filmed, the wires were virtually invisible.”

Wire was strung from eighty-foot-high manlifts to a tether point, usually on the ground, some one hundred feet away. The models constructed to travel on the wires were, in turn, anywhere from six to twenty-four inches long. “We cast models out of urethane foam, and put brass tubes through the middle of them so the wire could go through,” said Gutierrez. “Because they moved very fast and appeared mostly as blurs, they didn’t need to be finely finished with detail. Sometimes we’d drop the model down from the top, tail first, and then later reverse the footage, or aim it down and get a different angle. Other times, we’d mount small C-size Estes model rockets in the tail of the planes and then fire them up the wire. We even had the wire sometimes running horizontally, and used the rockets to launch the planes through the clouds.”

The Estes rockets actually proved useful in two instances. Not only did they provide real thrust to send the models along the wires, but they also solved the problem of how to recreate the X-1 and X-1A blasts when they first fire their engines after being dropped from the B-29. Originally, a bluescreen approach was considered — doing one pass on fiber optics that had been placed in the model’s tail, and then a second and third for liquid nitrogen and a beauty pass. But once again,

Kaufman was happier with the live-action approach, which not only added a greater sense of realism to the film, but also for the filmmakers as well. “Our rockets were supposed to do a controlled burn, ignite and blast smoke out the rear,” Gutierrez explained. “During one shot, however, some of the explosives backed up inside and the whole rear of the model blew off with a sudden gush of flame. John Fante was doing the shot hand-held, and he jerked because of the sound and the explosion, adding a very realistic quality that we couldn’t have gotten any other way.”

Besides unexpected rocket flare-ups and visible wires, Gutierrez had other problems to contend with while shooting up on the hill. “We always had to worry about the wind blowing too hard, the constantly changing angle of the sun, rockets that would fail, planes that got stuck on the wire halfway up. Sometimes we used different weights in the planes and different size rockets, different angles to string the wires. How fast the rocket would go was sometimes hard to predict until we’d done a few tests. We also had to hedge frame rates from 12 to 110 frames per second because they would vary based on the size of the models. And if everything else went all right, there were always the complaints from our neighbors. Even though there were no fire hazards or danger from chemicals, because the clouds were simply condensed mineral oil, they started passing around a petition just before we left. We had constant visits from the police and fire departments, as well. I can understand their concern — it looked like the hill was always on fire.” Considering the multitude of problems that could cause any one shot to fail, Gutierrez usually filmed with two to four cameras on every take to insure that when the shots *did* work, they would be covered from every possible angle.



Capsule footage originally composited over Jena Holman’s earthscapes suffered from a characteristic tendency to appear cut-out and pasted onto the scene.

The ultimate success of the live-action filming done at Hunter's Point, in the street and in the studio, eliminated the need for *any* motion control bluescreen images in the flight sequences. However, the Glenn capsule shots orbiting the earth *were* done in the more graceful motion control style, because it was appropriate to the look they were after. But even Chuck Yeager's famous victory roll, a corkscrew wing-over-wing flyby that marked the end of every successful test, was eventually done on the backstreet. A model X-1 was suspended by wires running through the tips of each wing. Then, as the model was turned wing over wing, a hand-held camera moved and zoomed, creating the illusion of the plane moving forward as it rolled over. Additional liquid nitrogen clouds were blown through to create distant clouds.



To remedy the problem, a net filter was placed on the optical printer lens when exposing the interpositive film onto dupe negative stock. The technique tended to enhance blacks, and more importantly, blend the capsule and earth backgrounds so that the final effect appeared to have been shot through a single lens. Modem Film Effects was responsible for all composites in the film.

"When I was at Edwards," Phil Kaufman noted, "I realized the effects work being done just didn't seem to have the vitality to it, the freedom I wanted to see. It seemed like it took so long to do each shot because they were so complex. There didn't seem to be any room to be daring, because it had become written in stone that you follow storyboards and do shots with motion control. When we finally reached the hill, we could say, 'Well, let's try this.' And pretty soon, Gary had three angles coming in, and we'd get fifty takes a day on the same shot. And they wouldn't be limited to just fifteen frames per shot because that's all they could get into that particular motion control move. In this film, I wanted the sense of being on the edge of chaos, and that's what the more radical approach produced. It also got everyone working on the effects more excited and more inventive; and I think that excitement shows on the screen."

"It seems hokey when you think about filming models up in the air," added Jena Holman, "but actually, you have all the elements you can't reproduce on a stage. You have wonderful, unlimited blue sky, the perfect key light in the sun that does anything you want it to, and you have the right reflections on the planes. You have everything you can't have on the stage without going through the process of comping everything. Some of the shots obviously don't turn out well — but the ones that do, look great."

Holman, in particular, found the live-action work done outside the studio very helpful in creating a greater sense of freedom inside with regard to the Glenn capsule sequence. Even though, with the exception of the reentry shots, the majority of the capsule shots were done motion control, she was able to be more inventive in finding ways to create some of the earthscapes viewed from space. "Trying to make the planet shots look alive without seeming hokey was very difficult. We did a lot of tests, shooting paintings and retouched NASA photographs and trying to add camera movements; but they still tended to look flat. When you go to *Star Wars* and look at their planet paintings, they're dead. They just sit there — which is fine for a fantasy film, but in reality, nothing just sits there. There may be just the most minute movement in the atmosphere — something playing off of

something else, but it's there. Even just moving a starfield against the horizon slightly can help bring the image alive. The audience may not perceive exactly what's happening, but the image will look more real to them."

Tests were done filming projections of NASA transparencies and some of Holman's paintings with wide-angle lenses. Holman thought they looked awful. She later did one pass on the NASA photo and a second pass with moving nitrogen, hoping the resulting composite would create the right sense of realism. Still, the final effect was disappointing. Trying to get a sense of movement, she projected filmed images of the earth onto a small silver hubcap, with promising results. Experimenting with other domed objects, Holman finally decided on a half sphere, forty-eight inches in diameter. "First we tried to project our images right on the dome; but when we did that, we also picked up everything around us, including the camera and the lights. So, the next obvious step was to put it behind a screen or something. What we finally came up with was a rear projection system in which retouched transparencies were first filmed with camera movement included. Then this was rear-projected onto the dome and filmed by a camera positioned between and below the dome and the rear projection screen. By carefully aligning the lens, we could see our images moving across the globe, and even move in and out on the dome again to capture some added movement and life."

The experiment worked, providing some interesting and realistic views of the earth from space. The technique, however, was perfected too late in the postproduction process to be of use. So instead, the earthscapes were produced independently by Jordan Belson, employing an alternate approach he had developed to create a number of more impressionistic views for the Glenn space flight. "Jordan's views are very surrealistic, although they border on realism," Holman noted. "He really makes you feel the earth is alive. It's a very moving, living effect. We tried to make starfields and they looked dead, but he created ones that gave the sense that they were almost breathing."

Just as the staff at USFX had to slowly evolve their techniques, experimental filmmaker Jordan Belson found himself facing new challenges and ideas while working on *The Right Stuff*. Known primarily for 16mm films such as *Music of the Spheres* and *Samadhi*, Belson was asked by Philip Kaufman to provide some unique images to represent the "demon zone" — that area beyond the speed of sound. Other taskings included producing the "fireflies" — strange sparkles of light seen by Glenn outside his cabin window, later determined to be ice crystals — and earthscapes.

"I first wanted to use Jordan years ago when I was working on the first *Star Trek* movie," Kaufman recalled. "Jordan is a true artist. His studio is like a monastery for film creation. Very few people are ever allowed inside; and when they are, they take their shoes off before they go in. His studio has very low ceilings and there are bottles of all kinds containing the kinds of things you'd find in a medieval alchemist's laboratory. From there, he creates skies and universes and strange light effects, using his own techniques."

"I don't use liquids or models," said Belson, who has been working for almost three decades creating unique visions in his small San Francisco studio. "I use mechanical and optical effects; and instead of using an animating table, I call my setup an optical bench." Creating his effects for *The Right Stuff* presented Belson with some unique challenges since he was unaccustomed to creating images that are essentially realistic. While he had allowed some of the footage in his earlier films to

be purchased and used in *Demon Seed* (the computer screen effects) and *Journey to the Far Side of the Sun*, *The Right Stuff* was the first time he had been called upon specifically to produce images for many different sequences in a commercial, theatrical film. To help get a feel for the project, he first constructed a small 16mm film.

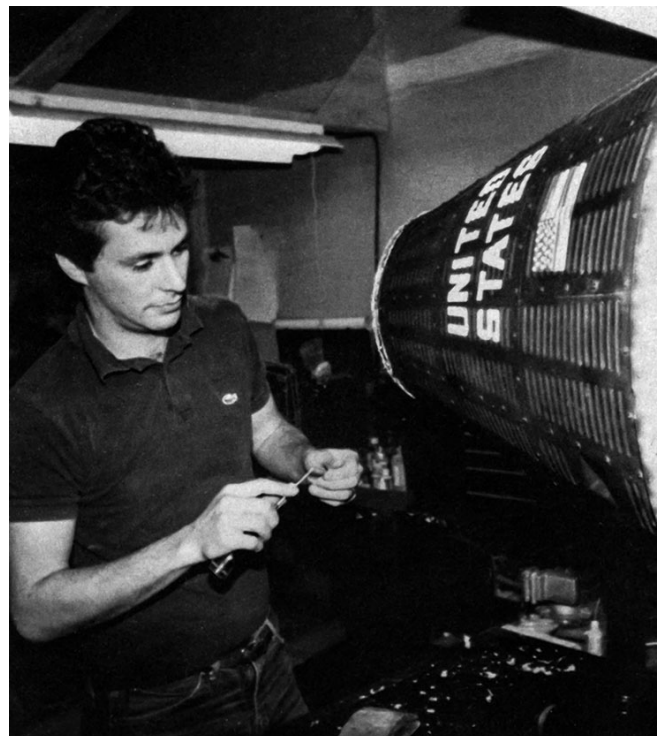
“My work being almost totally non-representational, I had almost no experience seeing it mixed together with real objects, real people or any attempt to simulate reality. So I thought if I could at least make a trial effort at mixing the kind of images Phil would be working with along with my own, I could see if they were compatible at all. The film, called *The Astronaut’s Dream*, took two months to make and lasts about eight minutes.”

“I always had the feeling Jordan could come up with the kind of effects that would work.” Kaufman added. “At the time, there were two dream sequences planned for *The Right Stuff*; and this short film was one way The Ladd Company could see what Jordan could do with available stock footage and his own input. When we showed it to them they were very intrigued. Strangely, that was really kind of a takeoff point, and we ended up using very little of that approach in the actual film. What Jordan ended up creating were much more inventive earthscapes, demon zones and strange speed effects — things he’d never done before. I think he’s produced some extraordinary images.”

The Right Stuff ultimately allowed Belson to experience a new frontier — not unlike Yeager and the astronauts — because while he had worked with 16mm for decades, he had never filmed his images in 35mm. “I had quite a few problems all along the line. Sometimes they were just technical, in that I had a vibration I wasn’t sure how to get rid of. A lot of the things I do are on a relatively small scale, and the question of vibration is a very crucial one. I had to face that almost immediately, because 35mm cameras — compared to 16mm — are big, grinding affairs that get the whole optical bench vibrating. Also, because I do work on a small scale, I had problems getting the angle and perspectives with 35mm that Phil had come to expect. Even so, I discovered far more subtlety in my work than I had ever noticed before with 16mm.”

Like Gary Gutierrez at USFX, Belson often found himself struggling with trying to create the images Kaufman wanted. And like Gutierrez, there were many moments filled with frustration. “Jordan works with microcosmos and creates cosmos,” Kaufman explained. “He’s always looking for a new approach, and he comes up with things he never knew he could. They come out of an artistic struggle. There were many times when he was ready to throw up his arms and say: ‘That’s it. I can’t do it!’ But he always came back. I’ve always wanted to preserve his artistic integrity and his freshness of vision. He approaches things in a very focused way, which is part of his genius.”

“One thing about Phil is he’s persistent,” Belson added with a laugh. “If you don’t get it the first time,



he doesn't say to forget it. He just waits a while and then asks you to try it again — and again. Over a period of two years, he asked me try some things more than fifteen times. Even though I might have given up out of frustration after the first time, he pushed me way past the limit which I would have had no reason to go beyond myself; and every time I did, it led me to make new discoveries. I don't know how he knew I could do it."

"When we were beginning the effects work," Gary Gutierrez concluded, "*The Empire Strikes Back* had recently been re-released, *Firefox* was coming up, and there had been a high-riding peak of what might have been called the 'Triumph of Motion Control.' To buck that, at first, didn't seem appropriate. For me, I thank God for Phil Kaufman, who distrusted that approach enough to want to try for something different. He really pressed me for something unique, which I think he believed I could deliver. After some trial by fire, I realized I could."

For Kaufman, the odyssey of making *The Right Stuff* was a long one. "It takes a long time for the effects concepts to come into sync, because it's not as if I knew how the effects should go two years ago — or that Gary or Jordan knew. It amounts to an artistic relationship that involves trying different approaches, and growing. At the beginning, none of us could have perceived the evolution. For a while, some people felt the Belson material seemed very far removed from the other, but gradually the two came together and joined. When I originally wrote my screenplay, I thought it would happen. But now that it actually has, I am delighted."

Adam Eisenberg is an ex-Coloradoan who now writes on film from Los Angeles. His prior work has appeared in *American Film*, *Prevue* and *The Denver Post*.

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an eighty-foot-tall manlift, ignited, and then photographed from below as it descended.

BRAINSTORM

Getting The Cookie At The End

article by
Brad Munson



If there was ever a film the world seemed to conspire against — a film that, by all rights, should never have made it to the screen, *Brainstorm* is it. From the beginning, Douglas Trumbull's very special story about a machine capable of recording all perception was plagued by the worst kinds of problems. But now, after three years of production, politics at two major studios, the death of a principal actress, two long and debilitating shutdowns, and months of litigation, *Brainstorm* is finally completed — primarily because Douglas Trumbull simply refused to let it die.

Some of the controversy is well-known — the tragic drowning death of Natalie Wood only days before shooting was to be completed; the subsequent lockout by Metro-Goldwyn-Mayer; the \$15 million insurance claim that, ultimately, Lloyds of London refused to pay, offering instead a lesser amount to see the film completed in a minimum amount of time and with minimum expenditure.

The result is a tribute to Trumbull's determination, and the ingenuity, organization and tenacity of his cast and crew. *Brainstorm* has none of the tell-tale signs of last-minute panic in the editing room or quickie cover-ups. It is, in fact, one of very few effects-oriented films in which concerns with the characters — the troubled marriage of Michael and Karen Brace (Christopher Walken and Natalie Wood), the intrigue and betrayal between Brace and the nameless conglomerate which owns him, the mystery of life after death that he very nearly solves — overshadow the genuinely stunning effects, despite all predictions that the film would never be completed at all.

For Trumbull, the origins of *Brainstorm* date back to his future General days, when he and his effects crew were busy concocting visual wonders for *Close Encounters of the Third Kind*. Joel Freedman, who intended at the time to produce *Brainstorm*, presented Trumbull with an early draft of the script. Trumbull's initial reaction was that it needed a lot of work; but the central premise intrigued him — the idea that a machine could record the experiences and perceptions of one person and then play those sensory recordings back for any number of other people, straight through a helmet that fit snugly over the skull — in essence, the ultimate form of communication. What's more, as a concept, it meshed very nicely with Trumbull's plans for his own Showscan process.

"I told Freedman I'd like to direct the film," Trumbull recalled, "but he said; 'No, no, no. I don't want you to *direct* the film. I want you to do the special effects.'" Trumbull turned him down. Weary of

devoting himself solely to effects, he was looking for other challenges — films to direct, as he had *Silent Running*. When Freedman refused to reconsider, Trumbull countered with an offer to buy the property outright, but Freedman declined. For months, nothing further happened — until Freedman saw *Close Encounters of the Third Kind*. “I don’t know what it was that *Close Encounters* did to him,” Trumbull commented, “but at that point, he decided I was the right person. I said great, so he and I got into a development deal with Paramount, which was the parent company for future *General*.”

Fortuitously, Paramount had already asked Trumbull to develop a feature film that would showcase the Showscan process. *Brainstorm* seemed the perfect project. Developed initially with an eye toward amusement park theaters, Showscan was Trumbull’s response to the lamentable fact that standard 24-frame-per-second projection of motion picture film truly stretches the limit of the mind-eye’s persistence of vision. By developing a system which both photographed and projected 70mm film at 60 frames per second, Trumbull reasoned that he could heighten the filmgoing experience by presenting a high-resolution image with two-and-a-half times the visual information of normal projection. And indeed, a prototype demo reel — featuring point-of-view footage taken from helicopters, race cars and roller coasters — dramatically suggested a sense of dimensionality and viewer involvement that was altogether extraordinary.

For *Brainstorm*, Trumbull’s idea was to use his widescreen Showscan process only for the images perceived through the “reality recorder.” The bulk of the film would be shot with a narrower aspect ratio at 24 frames per second, then optically converted to 60 frames per second by double- and triple-printing alternate frames. Thus, even though the entire film would then be projected at 60 frames per second, only those portions featuring the Showscan technique would be dramatically enhanced. But, as with all new technologies, there were problems. “It would have been a big job,” Trumbull admitted. “We would have been facing anywhere from fifty to a hundred thousand dollars to get each theater properly equipped to show the film. And when it came down to the crunch, Paramount had to make a decision.” Their decision was to pass on the project. And since Trumbull had insisted that *Brainstorm* and Showscan be locked together — that “if they said no to Showscan, they had to say no to the script” — *Brainstorm* was put into turnaround.

But *Brainstorm* — and Trumbull — had only begun to fight.

By the time Paramount finally turned the movie away, Trumbull had already conferred with David Begelman, then head of production at Metro-Goldwyn-Mayer. “He’d been asking for months what I’d been doing; and he said whatever it was, he wanted to be first in line.” So Trumbull pitched his *Brainstorm* project to M-G-M. A new deal was struck, and the project went into another phase of script development. *Brainstorm* showed definite signs of a second life, with one notable change — Showscan was not to be part of the project. Not at all. “When I realized it was a completely closed issue there,” Trumbull said regretfully, “I proposed a fallback position.”

Now the basic narrative would be photographed in flat 35mm, using a nonstandard 1.66:1 aspect ratio. POV images for the recorder, however, would be generated in 70mm and projected full aperture — thus widening the screen, changing the aspect ratio to 2.21:1, and sharpening the clarity. In addition, most of the recorder images would be shot with a massive fisheye lens to make the difference even more pronounced. “I wanted to make as dramatic a change as I could in the cuts,” Trumbull said. “It’s very effective, but almost subliminal. Many people don’t even notice it.”

The giant fisheye lens was very similar to one used by Stanley Kubrick almost twenty years ago in 2001: *A Space Odyssey*. “People are not aware,” Trumbull commented, “of how many shots in 2001 were shot with a huge fisheye lens, to give you a really wide feeling. Stanley used a Fairchild lens that was built for *Oklahoma* by Todd-AO. Ours was an OmniVision lens, almost identical in size and configuration. It was just a sharper lens, designed by Milt Laikin and engineered by George Randle. It actually weighed more than the camera — a twenty-nine-pound lens.”

With the green light from M-G-M, Trumbull began assembling his crew. First and foremost, Trumbull selected Richard Yuricich as his director of photography. Yuricich, in turn, assembled the team of gaffers, grips and film technicians that would eventually work on the film. “Although Dick had never shot a feature film before, M-G-M acquiesced to my belief that he’d be great, particularly in a film utilizing all these unusual formats and effects.” John Vallone, whose speed and creativity in producing *Star Trek*’s Klingon bridge set had much impressed Trumbull, was hired on as production designer. Then, for his visual effects supervisor, Trumbull chose Alison Yerxa, a painter and theatrical designer whose first major effects work had been on *Star Trek*’s V’ger cloud sequence. “I selected Alison because of the work she had done with the V’ger problem in *Star Trek*. She was one of the few people I’ve found who has the ability to do really far out, abstract thinking, and then translate it into a piece of artwork that can be shot in some methodical way.

Communicating that kind of imagery and actually forcing it through some kind of systematic process to create animation shots and optical shots and miniature shots that all fall together is a very difficult job. It’s really tough trying to explain to the cameraman or the optical camera operator what you’re trying to do.”

The *Brainstorm* challenge came in two parts, separated by effects technologies and time. Before production could commence, it was necessary to create both a believable reality recorder and the lab from which it would spring. Then, in post-production, there would have to be special effects designed to illustrate the machine’s remarkable capabilities — specifically one crucial sequence that would show the perception of the machine’s scientist-creator, Lillian Reynolds (Louise Fletcher), as she dies from a heart attack and goes into a kind of life after death,



Douglas Trumbull frames a shot of Christopher Walken and Natalie Wood in Brainstorm. Trumbull’s second directorial effort, Brainstorm traces the development of a sensory recording machine capable of recording the physical and emotional responses of one individual and playing them back directly to another.



Before principal photography could commence, Trumbull’s action prop unit — under the supervision of Mark Stetson — had to produce numerous versions of the sensory helmet and recorder, as well as modifications to the recumbent bicycle Walken rides in the film.

Lillian's death perceptions had always been pivotal in the script, but in earlier versions had taken a completely different turn. "In the original," Trumbull said, "it turned into sort of a huge negative vision of the future, with everybody on tape — everybody's soul and thoughts and inner communications on a purely electronic basis." There were also glimpses of an apocalyptic nuclear holocaust someplace down the line, and Michael's unexpected precognitive visions of his own future. "We hemmed and hawed around that for a long long time, and it was really Christopher Walken and his very strong insistence that we were going too far — that we were trying to do too much in two hours' time — that made us change our minds."

Trumbull was looking for a more positive, more visceral concept for the Death Tape, and it crystallized when Richard Yuricich introduced him to the work of psychologists Stanislav and Christina Grof. "Stan Grof was a very highly thought-of Freudian analyst in Czechoslovakia in the early Fifties, who was asked by the Sandoz Corporation to do some experiments with LSD." What the Grofs found was that LSD caused many test subjects to regress to their own births — to the traumatic moments that begin with the euphoria of the womb, grow painful and uncertain as contractions begin, become terrifying and horrible during the actual journey down the birth canal, and then — in something like a psychic explosion — end as the consciousness enters a larger, more challenging, wide world as a successful birth is completed. "The Grofs found that the moment of birth had such a powerful effect on later development in the patients that there were a lot of relationships between specific things that went wrong or occurred during the birth process and what was going wrong or occurring in the patients' real life. Based on this research, Grof formulated a whole system of ideas about the way various cultures developed religious beliefs, art forms, music forms and rites of passage — how anything from a bar mitzvah or a marriage, to an Indian ceremony of manhood is a reenactment of the birth process."

Grof demonstrated this concept by creating a slide and music show, cobbled out of images clipped from magazines and books, that was presented in four phases. "The slides in the first phase were very idyllic images of warm sunlight, soft flower petals, downy kinds of things, corresponding with very gentle music — soft chimes, bells, nice sounds. Then he would go into a phase of images such as people on the sea with the wind starting to come up, or people standing on the edge of a cliff — anxiety images — and the corresponding sounds would be a little more atonal, with the rhythms picking up a bit. Then he'd go into a sequence of all the horrifying images you ever think of in your life — of wars and death and destruction, dismemberment, horrible sadomasochistic torture, pain, fire, ice — real Heironymous Bosch kind of horror, with a loud, completely atonal cacophony. Then, suddenly, in a burst, the whole thing would go idyllic again. The sun would come up. Flowers would bloom. Everything would be fine — better — again."

Grof showed his hour-long presentation to numerous audiences, and with remarkable results. "Some people would really go with the whole thing," Trumbull said, "and by the time it was over feel completely euphoric, like they'd really been through something successful — like a great three-act play. Others would get 'stuck' in the hellish nightmare sequence. They'd just come unglued and have to leave the room." But the effect of the slide show itself was undeniable — and it was those gut-level responses that Trumbull decided he wanted to elicit with Lillian's Death Tape.

“Lillian’s death would be that kind of experience for the audience, but not structured in such a way that large numbers of people would get up and leave the theater. We would soften it enough to where everybody would be able to get through it, but try and show that thing — the idea that getting to something worthwhile isn’t always that easy. It’s a lot of trouble; it’s a lot of hard work. You have to be absolutely determined and see it through. But if you have integrity, if you have determination, and if you’re willing to work really hard and take risks, you can get the cookie at the end. It’s as simple as that. So we structured the effects along that curve — the whole idea that you have to go through hell to get to heaven.”

The development of those four specific phases for the Death Tape — euphoria, anxiety, hell and heaven — was a long process that was turned over to Alison Yerxa early in the game. “Originally,” she said, “it was thought of as one large sequence, but then we decided to do it as very quick inserts that would be shocking in magnitude, where you’d just look at something for maybe five seconds, and then go right back into the movie.” To crystallize the images themselves, Yerxa began to collect not only information on brain/mind research and life-after-death investigations, but also artwork that might serve as a jumping-off point. “You can sort of divide all artwork up into one of the four categories. When we got around to hellish visions, for example, there were certain things that were so obviously hellish, that had down through the ages always been hellish — visions of suffocation, of having bodily harm done to you. After a while, we found we could isolate almost everything into one category or another.”

Though research and planning began early, the actual special effects work would be left for the postproduction phase. First, the physical equipment required for principal photography had to be constructed. The task fell to Mark Stetson, who had first worked for Trumbull on *Star Trek* and who had later graduated to miniatures supervisor on *Blade Runner*. In fact, for several months, Stetson and his crew were to work simultaneously on both *Blade Runner* and *Brainstorm*. “Doug asked me if I would head up a shop to produce all the electronic gadgets and props for *Brainstorm*,” Stetson recalled. “I was kind of reluctant, because until then my experience had been limited primarily to miniature construction. I said, ‘Are you sure you want me to do it?’ Around that time, though, we were given the job of rebuilding the Voight-Kampff machine for *Blade Runner*, and Doug seemed to be impressed. He said, ‘Sure, I know you can.’ We tried to keep as many of the same model people as we could. The projects meshed together nicely; as *Blade Runner* was winding down, *Brainstorm* was gearing up. It kept a lot of people busy.”

Stetson’s first major project was the creation of the reality recorder itself, in a number of versions. There was the giant test chair featured in the early moments of the film — “Big Bertha, the Jet-Engine Hairdryer,” as it was known. Beyond that, there were five generations of sensor helmets to be built, and three different versions of the recording machine itself, as well as a great deal of dressing for the lab.

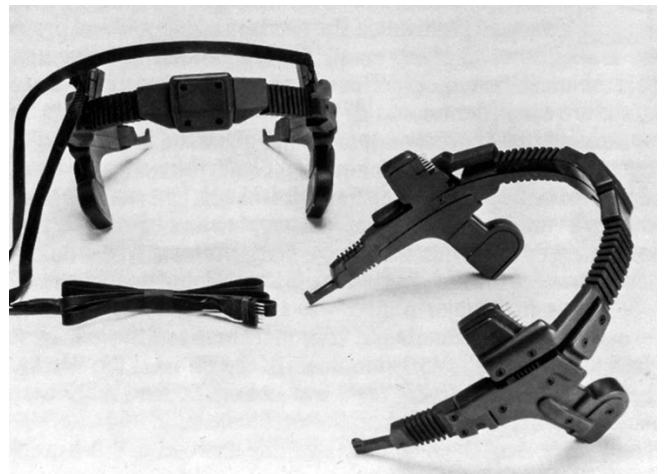
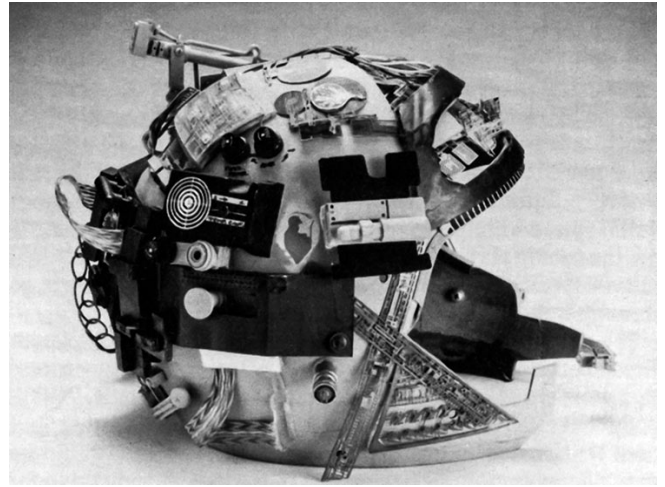


Louise Fletcher monitors the console of the main sensory recorder while Christopher Walken sits under "Big Bertha," earliest of the helmet prototypes. Most of the key props were assembled from cannibalized bits and pieces obtained from industrial scrap yards.

“It was a little haphazard at first,” Stetson recalled. “But we determined very early on what our approach would be — that the lab would be this assemblage of existing parts.” By rummaging through fifteen or twenty local scrap yards, Stetson was able to find suitable raw materials for most of the major action props called for in the script. Tom Cranham, working in conjunction with production designer John Vallone, would then prepare concept sketches showing how the raw materials could be assembled into an appropriate end product. “It’s amazing how close some of the sketches and the finished props were,” remarked Stetson, “considering the technique. We found a lot of neat-looking gizmos, and then made them into neater-looking gizmos that looked like they were directed towards one purpose.”

Big Bertha’s nine-foot base-frame, constructed primarily by Tim Huchthausen, was a very sturdy construct with a ring gear mounted to an X-frame. Upright members were welded to it, to support and swivel, and the main cage on top was made from several additional elements. The first was a satellite subframe. “We never quite figured out what it was made of. We guessed titanium. But it didn’t cost us anything. We bought it at a dollar a pound, or something like that.” The tubular section behind the satellite sub-frame was a missile component; behind that were back-to-back intake screens from an F-104 Starfighter. “Behind the F-104 sections was some sort of circuit rack that housed circuit cards from an old missile installation — missile radar or something like that.” Detailing of the monster machine was accomplished by Leslie Ekker and Chris Ross.

The various sensor helmets and playback machines were designed in a more structured way. “The idea was that you’re following the generation of the helmet,” said Stetson, “so you see the evolution of its design from the initial first working concept to the finished product. Different guys worked on different helmets — took them in hand. John was particularly scrupulous about some of the designs. Leslie Ekker did a little acid-etching work on the first helmet to give a finer, more spindly look than your



Three versions of the dozen or more sensory helmets constructed for the film. Inherent in the concept was the idea of depicting the refinement and streamlining of the basic device as intensive research and development progressed.

normal black plastic chips and stuff. In that sense, it was more like building a model. Doug was particularly concerned about the finished consumer version. He worked very closely with John Vallone and Tom Cranham on that one. John, in turn, closely supervised Tom Pahk in making the patterns. So they were pretty well structured. On the military version, John sort of turned Chris Ross loose. He would come in quite often to check on the progress, but for the most part, Chris was able to put a lot of his own design sense into the helmet.”

Concurrently, Stetson and his crew were devising three generations of tape machines. “There was the main lab machine — the great clunky cumbersome version Michael and Lillian keep tinkering with. The next generation was the field unit, the one they could take out and do some tests with. And then there was the portapack that you also saw being manufactured in the production line, differentiated by the olive-drab military-type case versus the gray, industrial-commercial case that Michael used. The tape machines were pretty involved. Bob Johnston did the mechanisms work inside all three of them, figuring the geometry of the tape that would travel across the loop-to-loop heads, and making it work at various speeds.” The tape drive mechanisms were originally designed for 70mm film, and the exotic “tape” that replaced it for the reality recorder was a special mylar stock ordered from 3M and custom slit to 70mm width. It had a gold finish on one side and a slightly silvery look on the other. A working laser, similar to those used for laserium projection shows, was provided by Laser Images and built in to generate light patterns from the machines. “Guy Marsden and Leslie Ekker did some slitscan photography to generate patterns on the tape that are supposedly etched into it by the laser. It’s very subtle, but there are six different patterns of brainwave recording on those tapes, some of them very erotic — like the sex tape of Gordy and the pretty lab assistant. The material that was slitscanned, then stretched out and printed onto the tape was hardcore porn — *very* hardcore.”

Stetson and his crew were also heavily involved in dressing the lab set, modifying the recumbent bicycle used by Walken, and programming the industrial robots employed in the assembly line sequence. In fact, it was not until much later that they would actually get back to miniatures work, most notable in the construction of a two-foot replica of the Wright Brothers Memorial, complete with rotating beacons, that appears off in the distance in the final moments of the film.

Meanwhile, another team was busy producing voluminous readout material for the dozens of video monitors which would appear throughout the film. “I didn’t expect to spend so much time on the video,” Alison Yerxa confessed, “but as it turned out, there was video in almost every single shot in the movie, whether we liked it or not. It wasn’t really budgeted for, or thought about that much. It was sort of at the last minute. We had four weeks to do it, and we all jumped in and did what we could.” A vital requirement was the SMRO (Sensory Monitor Readout) — a composite reading relating to heart function, breathing, hearing, smelling, tasting, touching. It began with a video waveform, generated with the help of Denise Gallant and Brian Samuels, using some of their own self-modified video equipment. “I went to them and explained what I wanted,” said Yerxa, “and we fooled around for a couple of hours and made a lot of displays. Then I took those back and worked out with Rhonda Gunner, our video editor, how we could lay graphs and text in on top.”

“It was pretty basic work,” said John Wash, who was largely responsible for the animation and graphics. “Since the picture takes place in a heavy-duty R&D facility, Doug wanted the video screen readouts to have a unique and very advanced look. We used lightboxes and filters and gels,

combining everything with standard video compositing techniques, and making up a lot of ¾-inch videotape that could be played back on the set as practical props.” Other video readouts, some garnered from medical facilities and biomedical manufacturers, were also incorporated into the package. Meanwhile, video engineer Greg McMurry was taking care of the hardware end, which was being built into a special video van. Once completed, the whole system was shipped to North Carolina, where extensive location shooting was to commence in the ultra-modern high-tech environment of the Burroughs Wellcome facility in Research Triangle Park.

Later, John Wash would contribute additional readout material employing a small computer he had purchased originally for a scene in John Carpenter’s *The Thing*, where it was used to create a geometric computer representation of an alien organism taking over a healthy cell. “The S-100 graphic system is one or two steps above an Apple,” Wash explained, “just a little memory-map raster graphics video device with sixteen-color capability.” The graphics for *Brainstorm*’s code-cracking sequence, along with most of the text that appears on computer screens throughout the film, came from Wash and his equipment, either built up on tape or generated live from the video van. “When they were shooting one day’s stuff, I was busy programming what they’d need for the next day, working ahead right there on the set.”

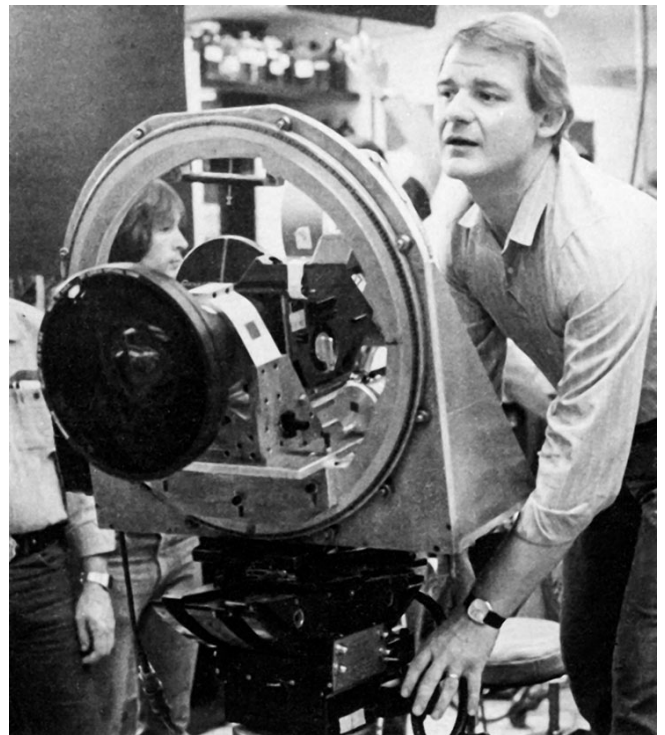
Once the location shooting was completed, cast and crew reassembled back in Culver City for the final weeks of shooting on Stage 29 at M-G-M. The scheduled early-December wrap, however, would not be met. On November 29, 1981, the film community was stunned by the tragic news that Natalie Wood had drowned in a weekend boating accident off Catalina Island. The next day, M-G-M hot-locked Stage 29. A week later, everyone involved with *Brainstorm* was terminated. Soon thereafter, the studio filed a \$15 million insurance claim with Lloyds of London. The film, they maintained, simply could not be completed without Natalie Wood.

Trumbull knew better.

The fact of the matter was that Natalie Wood had completed the vast majority of her work. After carefully reviewing all that remained, Trumbull insisted that only minor restructuring would be



To suggest a maladjustment of the sensory transmission system, Trumbull devised a striking effect for an early POV shot. Beginning with a rotating shot photographed in the main laboratory set, the postproduction unit prepared a series of concentric ring mattes and rephotographed the lab footage on the effects facility matte stand, exposing one piece of concentric material at a time and slipping the sync between exposures to skew the images into a vertiginous vortex. Ultimately, however, Trumbull felt the shot was potentially confusing and so he cut it from the film.



necessary. Still, M-G-M said no, sparking industry speculation that the financially troubled studio needed a quick payoff on the insurance claim to solve its immediate cash flow problems and was willing to sacrifice *Brainstorm* in the process. Unable

to get a reversal of the shutdown decision, Trumbull took his case direct to Lloyds of London; and in February of 1982, the insurance company agreed to put up \$2.75 million for the completion of principal photography and the assemblage of a rough cut, sans special effects. When that was ready, they and M-G-M would decide if the film really could be completed.

Trumbull reassembled his cast and crew, and on February 5th, hosted a cocktail party at which he presented everyone with T-shirts that read “Lloyds of London presents *Brainstorm*.” What followed was four weeks of furious activity, as a rough title sequence was prepared and principal photography completed.

On April 16th, M-G-M executives were scheduled to view the rough cut. But before the screening began, a dispute erupted over a number of yet-unfilmed scenes, and the studio representatives walked out without seeing a frame. *Brainstorm* was canceled again, and months of litigation between all parties ensued. Consistently, doggedly, Trumbull insisted that *Brainstorm* was a quality, marketable film that could be completed and successfully released despite the death of its star.

Finally, late in 1982, a year after the tragedy and long after everyone but Douglas Trumbull seemed to have given up on *Brainstorm*, Lloyds of London agreed to provide an additional \$3.5 million to complete the film. In the process, Lloyds became a profit participant in the picture, affording them an uncharacteristic opportunity to recoup their losses. Included in the final sum was \$1.5 million for the postproduction effects — about half of what Trumbull had originally hoped for.

The final push was on. “We were starting at the beginning of December,” Alison Yerxa recalled, “sort of from scratch. And we knew we had a time limit that was very, very definite — the end of March. Everything had to be done by then.” Virtually none of the optical effects had gone beyond the planning stages. Now they had to happen in a matter of weeks. Planning, it was decided, was the key.

“We had a big board upstairs in the art department representing the trajectory of the Death Tape,” said Trumbull, “sort of a big wave-form that started with a time line representing life. It ran into more and more abstract images that were just memories of the immediate past — relationships and stuff like that. Then it took this big dive down towards hell, and then a big ascent up towards heaven. We just sort of mapped out which images would occur at which times, and where each of those images would fall specifically, relative to all the other action that was happening in the film.”

Meanwhile, Alison Yerxa was trying to communicate Trumbull’s highly abstract ideas to a group of old effects professionals. “It was difficult, it was wonderful, it was enlightening — it was all those things,” she declared. “I felt like I had a lot of things to keep track of, because there were so many things going on all over the place and because we were really pushing to get as much as we could.”

“Pushing” was an understatement. “It was tough trying to figure out how we were going to get all these shots done in the small amount of time allowed,” said effects cameraman Don Baker.

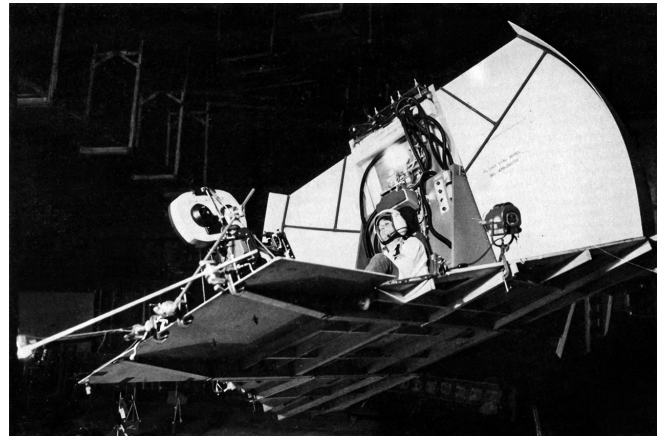
“Basically, we were first asked to figure out how long it was going to take for the heaven and hell

Matthew of photography. It's a very real and the preparations of shoot Christopher M. McKelvey's right to the camera. Only the bike and the bicycle is the section of street immediately surrounding them, are real — everything else is painted.

sequences, which hadn't really been boarded — it was all in Doug's head, for the most part. I think there were eight weeks to do it all in, and we came up with ten or twelve weeks as an estimate. There was just no way of doing it for the time and money allowed."

Some shots were thrown out right away; others were redesigned for different systems. "When we knew what we wanted in form," said Yerxa, "or knew what we wanted in sort of a conceptual idea, I made a large list of everything that would be involved in every single shot, and tried to divide it up according to camera systems. I knew what was needed for every shot, and just kept artistic dialogue going with people on how to get the whole thing so it would mesh together at the end — through rough story-boards, or talking, or running all over the building."

Sometimes Trumbull joined her. More often, he was busy elsewhere on second unit work, scoring, sound effects or management business. "I had to give them a lot of free rein," he said. "I think the biggest problem was the kind of communication we had. Drawings were always inadequate to show what the final result was supposed to look like. Verbal explanations were also difficult, and it was very hard on a lot of people to get through that. I don't know what more to say, except that when you get into the zone where nothing makes sense... nothing makes sense."



To get realistic flight simulator interiors of actor Jordan Christopher, Stetson and his crew removed the backhoe from a Case front-end loader and built the simulator cockpit onto its maneuverable arm.

The effects situation was further complicated by the fact that numerous live-action inserts would monopolize the special effects stage area for the first couple of weeks. Meanwhile, virtually the entire effects and model shops had to be rebuilt. “It’s always frustrating to go into a building and find everything pushed in one corner again,” Baker lamented. “I spent over a week just realigning the Compsy track. This time, though, I bolted it to the floor. They’ll never be able to move that track again.”

Compsy — the new, improved Compsy — was the key to the whole effects push. Don Baker and Richard Hollander, who had worked together on the prototype system used in *Star Trek*, would repeat their respective roles as Compsy cameraman and programmer. But it would take some weeks to get the revised system up and running, and shooting had to begin immediately.

The first possible order of business was the title sequence. “The titles were shot with raised plastic letters painted glossy white and mounted with double-sided tape on sheets of glass,” said Trumbull, “the same sheets of glass we use on our matte stand. I got the idea from advertisements I’d seen in airports — white sculpted *Time* magazine-type letters against some kind of photographic background. I thought it was a very striking kind of image.”

“We set up the camera like a motion control downshooter,” explained veteran cameraman Dave Stewart. “Then, to give a lot of bend to the titles, we shot with an extreme wide-angle fisheye lens — one that was very close to the same aspect ratio and gained approximately the same amount of distortion as the OmniVision. A curved track was used to swing the key light around in an arc during the shot, so the shadows would change on the letters as they advanced.”

But the real action went on behind the titles — in a sizzling, warping test grid that, viewers would later come to understand, was the scrambled image that scientist Michael Brace was seeing through the prototype reality recorder before it was adjusted and working properly. “We wanted to get a fairly strong rotation effect,” John Wash explained, “to give you a sense of vertigo and the feeling that you were about to slide over in your chair and fall into the aisle.” The effect was accomplished



During postproduction, the Compsy stage was dressed with an attractive but functional control booth and used virtually intact as part of the flight simulator facility.



Point-of-view footage for the simulator was shot on Compsy with an eye toward making it look like computer generated imagery. The streaking runway surfaces were slitscanned artwork, combined with stationary mountain ranges and sky. The aircraft was a modified model kit, photographed as a separate element.

on the Oxberry animation stand through informed improvisation by Wash and cameraman Don Baker. “It felt to me like some jazz musician jamming.”

“They were coming up with techniques to try and shoot these things on the fly,” Trumbull elaborated. “There are about three or four levels of opticals in the titles — an array created by running the camera very slowly while physically moving gels, filters and artwork. You’ll see some images on just one frame of film, where artwork is moved three feet, plus some moire patterns crossing, and colors changed, and gauze filters popping in and out. It’s just a zoo of doing everything wrong on the animation stand, but also trying to get these very controlled, rotational movements at the same time — everything moving in the same direction at different rates, overlapping, flashing, strobing.”

“Doug was asking for the worst animation ever seen,” Baker explained. “I said, ‘That’s pretty easy to do.’ But as it turned out, it wasn’t all that easy.” John Wash first designed the shot’s basic test pattern grid — “kind of a futuristic, snazzy test pattern that an optical technician might use” — then broke it down into component parts and rigged a rotational stage under the 65mm Oxberry camera. After some preliminary exposure tests, the two began their cinematic sleight of hand, letting the camera roll at about one-third speed while shifting artwork and various distortion materials around in what amounted to almost real-time animation. “I’ve never done anything quite like it,” said Baker. “We spent two weeks at it, shooting quite a bit every day — about four to six hundred feet of random animation.”

Meanwhile, the upgraded Compsy was nearing completion. “Compsy is really just a huge horizontal version of an animation stand that’s completely automated,” Trumbull explained. “It has twelve potential axes of movement; and it’s scaled up much larger than an animation stand. While the track on an animation stand might be five or six feet long, our Compsy track is about sixty-five feet long. And where the artwork on an animation stand might be twelve inches or sixteen inches wide, our Compsy artwork is ordinarily about seven feet wide by three feet tall. The artwork can move vertically about six feet, or it can move horizontally about fifteen feet; and the camera can do all the normal things a motion picture camera can do, plus a few extras. It can pan, it can tilt, it can focus, and now it can roll 360 degrees on its center, at any rate and in any sequence you want. The camera can run forwards and backwards to any frame that it wants, to shoot a single-frame exposure or a series of exposures. It has a capping shutter in front of the lens so that it can put multiple exposures on one frame of film, or simply close the shutter entirely while it runs back to some other frame or some other position. The lens focuses automatically, depending on its distance from the artwork, and there’s a neutral density filter wheel between the lens and the film plane, to change the brightness of the incoming image. The shutter can remain open for any period of time while the camera moves to create a streaking effect, and the whole thing is controlled by a rather sophisticated computer and computer program, which allows us to load it with a complex series of commands so it can go through hundreds of exposures — many hours’ worth. Then, when it’s completed, it can beep the camera operator on his pocket pager and tell him to come back into the room.”

Compsy — short for Computerized Multiplane System — was built originally for the V’ger cloud sequence in *Star Trek*, and was later used in *Blade Runner*; but for *Brainstorm*, a great many physical improvements were made. “The old Compsy had no roll at all,” Trumbull continued. “Well, we were

able to give it *some* for the wormhole in *Star Trek*, by putting two gearheads on top of each other so one gearhead would handle pan and tilt and the other would give us a little roll. But it was a very sloppy way of doing it. Now we have a 360-degree roll, pan and tilt.”

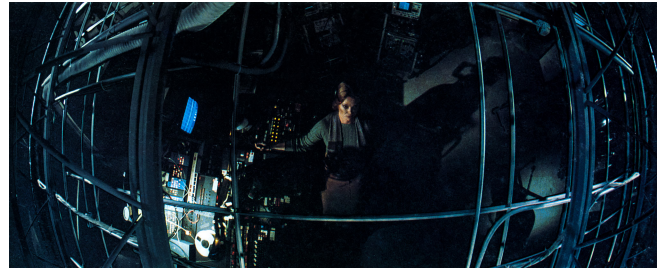
Compsy’s alterations, engineered by Greg McMurry and put into effect by Mark West, proved a delight to those who would be using the system. “Everything worked great,” Don Baker marveled. “It was the first time that a new piece of equipment was brought on stage and just *worked*, with no problem.” Richard Hollander was equally pleased. “It allowed this automatic, very repetitive exercising type of shooting to be done really fast, and very accurately.” Nevertheless, the high-tech environment called for some decidedly low-tech solutions to certain problems. Often, a single piece of film stock would cycle through the camera so many times that tiny bits of celluloid would shear off and threaten to obscure the exposed images during camera rolls. For all the technological hardware at their disposal, the camera operators found that the easiest thing to do was to put a bit of double-sided tape on the bottom of the camera’s inner casing to catch all the film dust.

There were also problems interfacing the new Compsy with the organizational aspects of the effects push. “Compsy could be programmed to do certain things quite easily,” said Alison Yerxa, “as well as certain other things that weren’t easy. It took me a while to learn the difference. Of course, when I’d say we had only twelve hours to do a shot, that became overriding. ‘Okay,’ we’d say, ‘what can we do in twelve hours that would be just enough of a challenge to give us a little excitement?’”

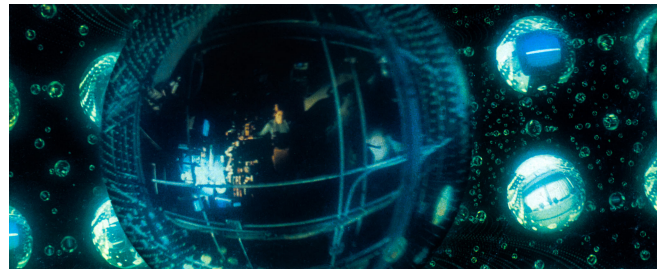
Almost immediately, Compsy was loaded up with work, twenty-four hours a day; but there was still major effects footage waiting to be scheduled. The Oxberry was drafted into service at every opportunity. Some effects were simply bluescreened; others accomplished with interlocked rear projection and handheld cameras. Three different stages had camera crews working around the clock — not including a jerry-rigged stage constructed at the model shop when things got particularly tough.

And the clock kept ticking.

Trumbull was especially concerned about the first few minutes of the film. “I feel you only have two hours of an audience’s time, and you’d better not waste any of it. If you do the first couple of minutes right, you can put them in a mood to accept almost anything; and if you bore them in the



Lillian's Death Tape begins with a classic representation of an out-of-body experience as the camera pulls up and away from her. Like other Death Tape imagery, the scene was shot in 70mm with a fisheye lens. The ceiling tracks, cables and ductwork were photographed separately and composited over the stage photography.



As the camera continues to draw back, the image becomes part of a memory bubble, one of thousands in a vast floating array of living recollections.

first two to five minutes, you're going to have a hell of a time picking it back up again. So I felt it was very important to really go for their throats."

Trumbull proposed to do that with a stunning "vortex" effect, showing a warped, vertiginous version of the scientists' lab from the point of view of Gordy Forbes, the recording technician. "Richard Yuricich photographed the original shot using a 65mm camera with this godawful fisheye lens," John Wash recalled, "a 180-degree view, full-frame on 65mm film." The shot, photographed on the main lab set at M-G-M, was achieved through the use of a rotating camera rig that allowed the camera to roll more than 360 degrees during the course of the action. "The shot itself was slowly turning and swooping as Gordy's point of view rotates and comes to rest on the lab floor. What Doug wanted to do was break up the image — as if you were looking down at a whirlpool and the image was painted on its surface and given that circular warp."

In postproduction, Don Baker carefully plotted the camera move, then turned the shot over to David Hardberger and Josh Morton who accomplished the vortex effect on the facility's custom matte stand by employing a series of twenty-five concentric ring mattes. "In the center frame," Trumbull explained, "the image is just a little dot. Then there's a ring around that with another part of the image, and so on. Each of these rings was printed about five frames farther out of sync than the one inside it, so the center of the picture is out of sync with the edge of the picture. Since the camera is rotating, the center image is rotating several degrees more than the edge of the image, and you get this spiral convoluted distortion. It was a wonderful effect." The final version, however, was so abstract that Trumbull ultimately came to feel that it might keep the audience from understanding what was going on. As a result, he abandoned the complex optical and went back to the untampered-with rotating camera shot. A lot of time and money had been spent on the vortex effect — three or four double-shift days on the matte stand — so the cut was not an easy one to make. "The whole opening was my idea, but after looking at this thing for a while, I realized there was a good chance that the audience wasn't going to be with us at all if they didn't simply and concretely understand what the hell this machine could do. So I invented the whole scene of the test in the lab — where you see something, taste something, hear something — as nothing more than a training scene for the audience, to try and bring them up to speed with not only what the machine can do, but with the whole idea of experience as a way of learning something, rather than exposition telling you everything."

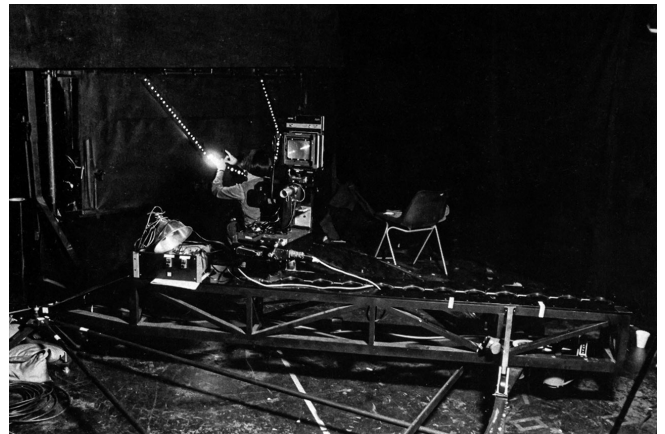
Except for the Death Tape, most of the imagery prepared for the reality recorder is virtually without effects, at least beyond the unexpected jump to 70mm SuperPanavision and the use of the OmniVision fisheye lens. However, two short sequences inside the flight simulator — the exterior of which was shot at Northrop Aviation in Southern California — did employ a significantly more sophisticated approach. "There's no computer generated imagery here," Trumbull said, though the flight simulations have that low-resolution videogame graphics look characteristic of most true simulators. "We just went out of our way to get that look. It was all shot on Compsy. Underneath was a streak layer, a sort of 2001 flat streak of artwork shot on the Compsy using a slitscan technique. And there's an artwork cutout of mountains and sky glow, and then the plane — a model F-16 that we bought from a hobby shop."

In keeping with Compsy's large-format capability, the original artwork — designed to simulate an airport approach when filmed with the slitscan technique — was a very large eight feet long by

three feet high. In this case, however, the size presented major problems. “As usual,” said Richard Hollander, “the slit was to remain stationary, at a specific height relative to the camera. But with the slit and this huge piece of artwork sliding behind it over and over again, we were worried that we’d tear the artwork apart. So Virgil Mirano came in and shot 8x10 transparencies of it for us.” Alison Yerxa then stripped a number of these basic transparencies into a more manageable, and less accident-prone piece of art, which was then backlit and slitscanned conventionally, with a slight camera roll added. “I was real pleased with that,” said Don Baker. “We had no time to test it. We just did it one evening, and it worked out very well.”



Foreground bubbles in the array contained moving images rear-projected and rephotographed on the Compsy system. Each individual bubble required three separate passes — one for the film image, another for the reflective bubble shape, and a third for the matte. Middleground bubbles were generally still images, similarly photographed in groups. Distant backgrounds were still photographs comprised of thousands of tiny bubbles.

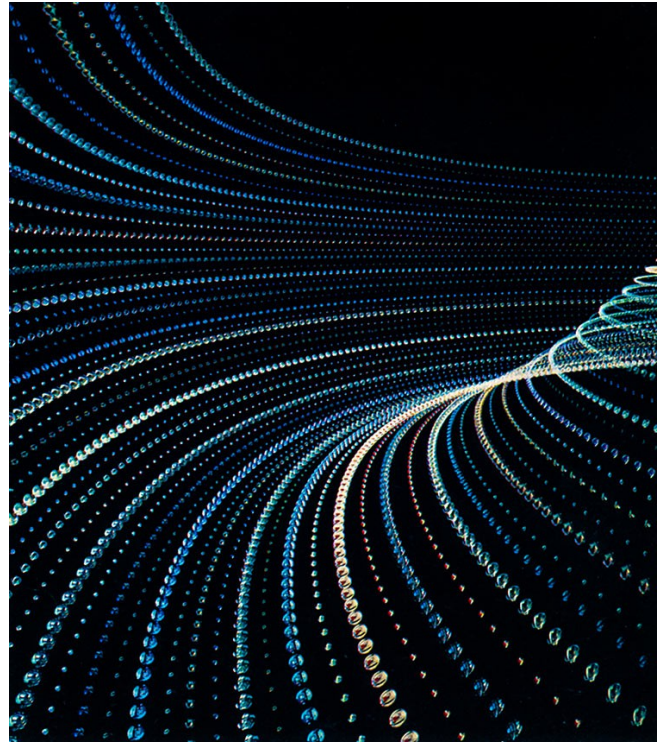


Artist Carolyn Bates prepares the basic artwork used to generate the distant background arrays. A 4x5 still camera, mounted on a curved track, would advance on the backlit bubble transparencies, making incremental exposures onto a single piece of film.

“Originally,” Yerxa recalled, “the flight simulator footage was to be more detailed, involving as many as ten or eleven passes. But it wasn’t part of the Death Tape and we wanted to have more time on other shots. We were really budgeting to the hour how much these cameras were going to be used, so we toned down the simulator shots to three or four passes.”

Building the simulator cockpit itself was a mechanical, not an optical problem. Mark Stetson’s shop rose to the occasion. “The cockpit set was mounted on a Case front-end loader, with a backhoe on the back. We drove it right into the model shop, parked it there for a month, and took off the backhoe shovel. Rick Thompson and Bob Johnston worked on building up a rolling cage that attached to the wrist of this backhoe arm, and then built the flight simulator interior into this rolling cage. An auxiliary hydraulic pump made the entire set spin around the roll axis. Then the rolling cage, with the set mounted in it, could be lifted up into the air and swung from side to side, kind of ‘whooshed’ upside-down. They had the thing fired up two-and-a-half weeks after we started working on it, and we were flying it around the shop.” Once completed, the flying rig was used to photograph cockpit closeups of actor Jordan Christopher. Reverse POV angles were shot in an actual F-20 cockpit at Northrop, with the simulator opticals matted in later.

Some of *Brainstorm*’s most convincing effects slip by virtually unnoticed. “All the shots of Christopher Walken driving home at night on his recumbent bike are completely fabricated,” said Trumbull. “Shooting at night is really very difficult. It takes twenty or thirty arcs and generator trucks and a huge crew to light up buildings and make it look like anything, and we just didn’t have the money or the time for that. Instead, we went out on the street nearby and shot some plates, with just Christopher Walken and the bike and certain sections of the street lit. Everything else, the local residential district and all, we matted out completely. Then we sent Virgil Mirano down to Irvine to get still photographs of as many modern buildings as he could. I took those still photographs, cut them out, airbrushed them the way I wanted, added sky glows and stars, and gave them to Matthew Yuricich who used them to produce some very accurate-looking matte paintings. There were some others, too. A few of the shots of Christopher and Natalie in the backyard at night had the sky and the treeline and the top of their house all painted. Matthew also added some clouds to a dull overcast sky in one of our shots of the Burroughs Wellcome building. All the *Brainstorm* paintings, I think, are very effective — mainly because people don’t expect them to be paintings.”



Depending on the artwork layout and the trajectory of the camera, differing formations of sweeping bubbles could be produced.

Meanwhile, the Death Tape sequence still loomed on the horizon — the series of shots that would illustrate what Michael Brace would see, a bit at a time, as he experienced the recorded death of Lillian Reynolds.

Even in those frantic, final days, the Death Tape sequence continued to evolve. At least two major segments were discarded, and one other — the hell sequence — substantially cut. One of the “lost” shots was dubbed “Condo Hell” by the crew. “It was sort of a basic Hades concept,” Stetson explained, “where we would cast up a lot of stuff and start assembling it in crazy perspectives, going off for no apparent reason — architecture gone mad, or industry gone mad, with a lot of meshing gears and threatening masks.”

The “threatening masks” were to be a series of rear projections inside military-looking flight helmets, roughly similar to the military versions of the sensor helmet. The faces inside the helmets, replicated throughout the “condo,” were actually still photographs of the effects crew and their families. “Every six frames,” Don Baker said, “there would be another person’s face, cross-dissolved over the next. But all the eyes would be perfectly lined up, so only the faces would change. It had a real weird look. With that imagery rear-projected inside, we shot the helmet in a series of four rows, multiplaned, with twenty helmets per row.” Ultimately, no comfortable place could be found for the offbeat shot, even though substantial production work had already taken place, and so it was dropped.

Another sequence, whimsically entitled “Miami Beach,” never even made it off the drawing boards. “The idea was to rise up through the ocean,” said John Wash, “to break through the surface and go up to this fantastic city — then off into space. That would connect you with the space shots, with leaving earth. The city was supposed to be a humorous, fanciful kind of reality. We were going to create this city with an incredible layering of all these beautiful things and buildings surreally colored — like a super-adult version of Disneyland. A combination of artwork and matted objects were going to fly past the camera, and there were going to be beautiful snowcapped mountains in the distance.”

“It was like passing through the present,” said Trumbull, “leaving the material world behind — combined with a sort of birthday party, a celebration. Just taking a few seconds to look at the material world, treating it all very lightly. It was like a big Fourth of July celebration, analagous to birth — a sort of good, upbeat idea. But we realized that, in terms of the mood of the film, it just wasn’t going to work at all, and that the really upbeat image was going to be much more awesome than that — and it was going to occur later, when he finally gets to the heaven image. So I abandoned the shot completely, though we spent a lot of time thinking about it and talking about it — planning for it.”

Despite changes, the completed version of the Death Tape, glimpsed throughout the Final portion of the film as Michael races to avoid capture, is remarkably close to the voyage that Trumbull originally described. It begins with the camera point of view rising away from Lillian’s corpse. “It’s a classic out-of-body experience, suggesting the letting go of life,” Trumbull explained. “Then there’s a fast re-experiencing of some of the things that have happened with friends or loved ones in recent life.” Finding the memories, and re-experiencing them, is accomplished through travel in an array of

“memory bubbles” — a display of seemingly infinite rows and ranks of floating spheres. Within each sphere is a fragment of living, moving memory.



As the Death Tape imagery begins to fragment into chaos, falling objects relating to elements in the film were juxtaposed over sweeping surreal backgrounds. In this shot, Lillian’s nitroglycerine pills — actually large disks of styrofoam — were dropped in front of a blue screen and then composited optically over a distorted representation of the Burroughs Wellcome building where much of the location footage was filmed.



Modelmaker Mike McMillen works on an organic representation of hell. The basic construct of foam and plastics was also fitted with translucent domes for rear-projected images of tortured souls.

The memory bubbles concept was set very early in the project. “We shot thousands of feet of film on all the different sets and locations, with a fisheye lens mounted on a 35mm Arriflex,” Trumbull explained. “That created a circular vignettied fisheye movie. As you look at the film and see this sequence of memory bubbles, if you really stopped the film and looked at one frame, you’d realize that in each of these circles there really is a movie going on, something you could recognize from the film. Just a whole web of memories, as if recollections of different times and places were all stored in some sort of huge array.”



Cameraman David Hardberger lines up on a test grid while stagehands position pieces for the original hell setup — later abandoned in favor of a more claustrophobic approach.

Occasionally, scenes not shot with the fisheye lens were used inside the bubbles by squeezing regular perspective 70mm photography down to 35mm anamorphic and using those instead. “My original idea was to never break the rule of always seeing these scenes from Lillian’s point of view,” Trumbull said, “But I talked to a lot of people on the crew and asked, ‘When you have a dream, is it from your point of view, or do you see yourself in the dream as well?’ It was about a fifty-fifty toss-up. A lot of people saw themselves in dreams, and a lot didn’t. So I decided to go ahead and break my rule on occasion, because there were moments of good dramatic dialogue that I didn’t want to leave out — when Christopher Walken and Natalie Wood are dancing in their empty house, for instance. That was all shot with a Panaglide, in 70mm. I shot it once with Natalie Wood dancing with the cameraman, and once with Christopher Walken dancing with the cameraman, looking into the camera the whole time. But then we shot it once, just for safety’s sake, with Natalie Wood and Christopher Walken together, with the cameraman staying as close as he could, sort of floating around the room. You just couldn’t beat that shot of both of them together. I had to take the license.”

Completed later during the postproduction effects phase, each memory bubble was the result of three film passes. One was a still transparency by Virgil Mirano that used a silver Christmas ball as a model, showing the outside of the bubble’s surface and the reflections of other bubbles around it. Second, there was the fisheyed motion picture, rear-projected inside the bubble shape, so each bubble had its own memory capsule. The third pass was a matte. The first three bubble levels were shot on Compsy. “We were working off one single bubble,” Baker explained, “so it was one of those very long, multiplane, multiple-pass shots, with each bubble mathematically placed on the film.” Compsy’s new roll capability came into play for the first time in this sequence, as the point of view swoops through the arrays, moving in on one bubble, then pulling back and moving in on another.

Richard Hollander was charged with programming the complex camera moves. “Effectively, there were three levels of memory bubbles. The ones in the very front featured the rear-projected film footage. Farther back, however, we used big sheets with little bubble transparencies on them. Those were nonanimated, but you couldn’t really tell.” Yet another approach was used for the far distant backgrounds. Dozens of individual bubble transparencies — an inch or two in diameter — were

stripped into opaque paper backings and then attached to a large lightbox. A 4x5 still camera, mounted on a curved track, would then travel along the track toward the lightbox, shooting discrete superimposed images onto a single piece of film. Depending on the layout of the original pasteup artwork and the trajectory of the camera, the result was a sweeping wave of receding perspective bubbles that could then be composited behind the featured foreground bubbles by Robert Hall's optical department.

After the stunning memory bubbles are visited and revisited, the Death Tape moves into its next, more threatening stage. "The whole thing begins to fragment and disintegrate," Trumbull described, "into something that no longer makes sense. We tried to do that with falling images of components that you've seen in the film — now completely out of context — sort of flying apart and descending in some way."

Originally, the "flying objects" shots were to be done with motion control. "But at that point," said Dave Stewart, "we had run out of motion control devices. In the past, on *Star Trek*, we had rented a lot of them, but we were getting down to the wire on *Brainstorm*, and when you rent things you tend to have to negotiate, to get things that are available, to interface the people to use them, and so forth." Instead, a simple bluescreen procedure was adopted. "It was kind of unique bluescreen, as we were still doing it in 70mm — which we hadn't done in the past. And Bobby Hall came up with a method of compositing it without taking ten thousand steps to get the final product." Best of all, it took only a week to do.

The first elements to be photographed were the background walls, shot with a multiplane technique by James Dickson. The walls themselves were individual four-by-eight panels comprised of electronic circuitry, company logos or architectural pieces, fashioned by the model shop crew. To suggest much greater length, the panels were first filmed streaking towards the camera. "Then the film was wound back in the camera," Yerxa explained, "to a frame corresponding to the entrance point for the leading edge of the next panel, causing the model to apparently be placed in back of where it was before, butting up against the previous image on the same piece of film."

Objects falling past the rushing backgrounds were photographed separately, frequently just tossed past the camera or hung on wires in front of the bluescreen. "The camera itself was not under motion control," Yerxa explained. "It was pulled back by grips, because the other cameras we had were being used for something else, and we decided that this was something we could get away with." Besides, she admitted, perfection wasn't really needed in this instance. "It was all going so fast."

The disintegration and descent of the consciousness had begun. Next, the point of view would enter Grof's third state of being. "Even though everyone referred to it as 'hell,'" said Trumbull, "it really isn't, in any literal sense. It's a hellish *image* of pain and torture. We used a lot of animal guts in that scene, trying to get the feeling of vulnerability and physical pain and compression in one rapid-fire burst of images."



Ultimately cut from the film was a shot dubbed “Condo Hell” — a bizarre juxtaposition of transforming heads and a vast geometric structure of diminishing perspective.



The facial footage was derived from still photographs taken of the effects crew members, carefully aligned and cross-dissolved every few frames to create an eerie ever-shifting image. Cameraman Don Baker aligns the rear-projected footage into the cutaway back of a flight helmet, which was then photographed in multiple passes on Compsy.

Of all the sequences, hell underwent more changes late in the process. “Originally, there was a glance toward nuclear armageddon,” Trumbull revealed, “but I ultimately decided it would take people out of the film and make them think about something else, so I shied away from that.” Then there was to be a larger, more awesome approach to hell — a vast landscape of organic plains and mountains festooned with raw meat and internal organs. “I wanted to do something quite different, where you would feel that there was something organic about it, but that it was totally in another dimension — that it didn’t adhere to any of the laws of physical science. It was going to be very organic, sort of decayed and desiccated, a horrible place with thousands of people all meshed in it, caught, trapped — all sort of flowing down towards a big Devil’s Garbage Disposal, and dressed with actual entrails and cow intestines.”

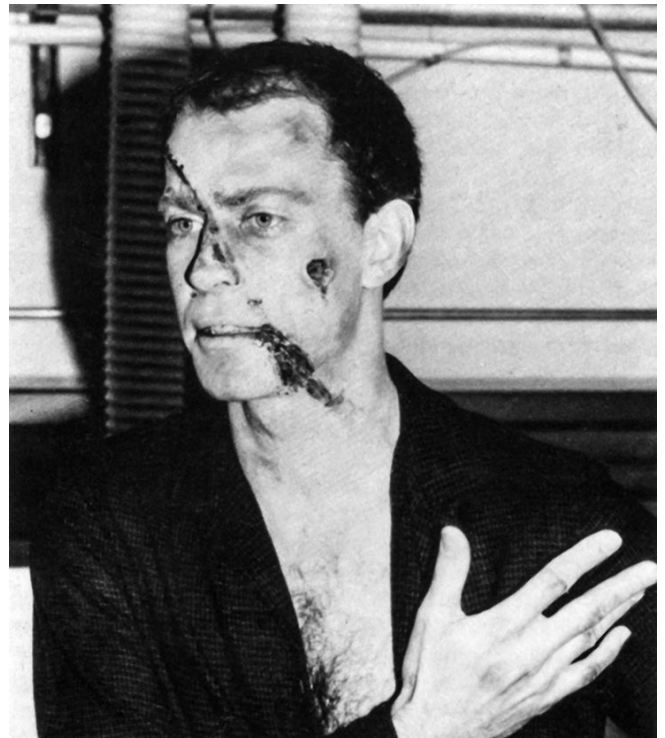
“To me,” Mark Stetson recalled, “it had this kind of concept of eternity to it. We had a plateau about thirteen feet across that we call ‘Chorizo Flats,’ because Alison found a distributor for sausage casings made by Union Carbide — a petroleum plastic, ninety-five percent of which are sold south of the border for chorizo. We took them, filled them with flexible foam, and twisted them up into intestinal shapes.”

The gruesome, organic-looking model would employ rear projection as well. “We filmed all the members of the crew, plus some friends, made up in the most horrible makeup,” Trumbull recalled. “And we crammed them all into little plexiglass bubbles and photographed them in 35mm. The idea was to rear-project them onto bubbles built into the model — sort of like pustulate boils covered with hairs and goop, like the stuff you find clogged in drains. That’s what we had an image of.”

Yerxa recalled the day of the plate photography. “We got two makeup artists and just sort of grabbed people in the building and made them up with bullet holes, gouges in their faces — very good,



Using buckets of entrails and methylcellulose slime, Paul Curley, Mark Stetson and Eric Allard dress one of the set pieces generated for the hell sequence. The giant sphincter-like construct — which erupted with calves’ brains — produced an image that was so disturbing and graphic that Trumbull cut it from the film after preview audiences reacted too strongly to it.



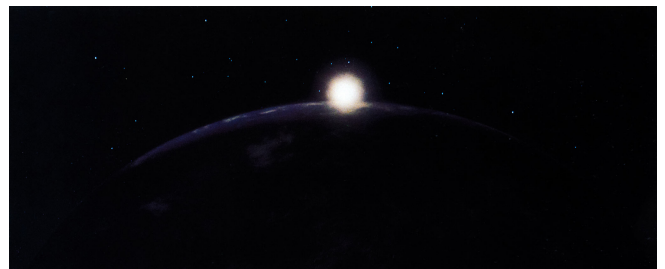
accurate state-of-the-art makeup, done very quickly. I think these guys had a lot of fun. Normally, they were used to working on one person over and over again. Here they had to do one an hour, and they got better and better at being able to do wilder and wilder ideas off the cuff. Then we sent everybody down to a little setup on the stage, where we sprayed them with blood and slime, and K-Y jelly, and shot them.”

Alison Van der Beek with her effects crew “hells” prior to shooting live-action segments for eventual rear-projection into the hellscapes.

Eventually, however, Trumbull was to take an entirely different tack. “Trying to create a large scale was the wrong way to go about it. What was needed was this incredible claustrophobia. So the actual result was easier to obtain, and I think more effective for the film.” The final effect, achieved using only fragments of the existing miniature, was shot hand-held by Dave Stewart, while an interlocked rear projector inserted screaming faces trapped inside the pustulate bubbles. “Those are the only effects in the film that are in 35-scope,” said Trumbull. “It was the simplest way to hand-hold and interlock with the rear projection at the same time, and still introduce a lot of camera shake. Originally, that sequence was about twice as long, and it was *really* gruesome. We got a lot of people in previews that didn’t like it at all — we went a little too far. I don’t know how many pounds of calves’ brains we shoved up through a big PVC pipe that sort of exploded out through a membrane — it looked like a big sphincter that opened up. But it was gross, and people couldn’t handle it. So we cut it pretty short. Now, the whole hell sequence only lasts about seven seconds.”

Then the Death Tape opens up into Grof’s fourth and final stage. “I was trying to do a series of images that would suggest that you could sort of travel through everything. I started out with something as simple as traveling away from the earth, so you could establish a sort of space environment, and then traveling through a galaxy in five seconds and going off into a world of pure energy, into smaller and smaller particles, to where you’re looking at a very symmetrical array of atomic particles and finding, in the nucleus of an atomic particle, a whole other world.”

The highly kinetic galactic journey involved about 120 different layers of artwork, photographed — again without motion control — by Dave Stewart. At the heart of it all was a series of some forty intricate paintings rendered by Adolph Schaller. First came a simulated snowstorm — actually a shower of styrofoam pellets filmed at night in the effects facility parking lot. Then came the ascent from earth — a matte shot in which the large planet in the foreground was projected on a dome, with a light kicker behind it to represent the sun. The moon in



Freed from Trumbull’s claustrophobic hell, the Death Tape POV soars into outer space, glancing back briefly before racing headlong through the universe. The planet earth was flat artwork projected onto a domed surface, with a light source behind it representing the sun. The moon and stars were separate painted elements.



The high-speed galactic journey was comprised of some 120 layers of multiplaned artwork — derived primarily from a series of detailed astronomical paintings rendered by Adolph Schaller.

the shot, along with the starscape, are separate painted elements. Then the camera travels through an array of multiplaned paintings, optically combined and joined with nebulous clouds of intergalactic space dust. There was even an element of astronomical accuracy in it all. “Adolph Schaller sort of mapped out a spiral galaxy,” Trumbull pointed out, “and then broke it down into planes of dust clouds, stars, nebulae and star clusters in the center of everything. I think it lasts only seven seconds, but it’s one of the most beautiful space shots I’ve ever seen.”

The shimmering “atomic particles” that came next were generated early on in the postproduction phase. “We actually created these three-dimensional objects by the use of bent wires,” said Dave Stewart. “We’d light the wires and rotate them on a double rotation axis to create both roll and pitch. Then, by leaving the camera shutter open as the wire rig went through its cycle, we’d get an apparent three-dimensional object through streak photography. We used strobe lights and standard lights, different bent configurations of the wire — all kinds of things. And by doing that you can get transparent shapes or solid shapes — it’s all a function of time and exposure.”

It was, by all accounts, a tedious process. “It took a long time,” said Yerxa, “more than we probably could have given it later on down the line.” Ultimately, two separate arrays of atomic particles were created on the animation stand. “It was really time-consuming to shoot these things on the stage,” said John Wash. “The camera was supposed to be floating toward them, and there are some big ones and a lot of little ones. But the footage they were getting had a nice frenetic quality to it, so we took a lot of actual 70mm frames and used them as original artwork, lining them up in proper sequence, getting them all registered to one another, and then rephotographing them on the Oxberry.” The background against which the atomic elements were composited turned out to be a painting Doug Trumbull had airbrushed as a concept illustration.

Finally, the Death Tape enters its last phase. “I wouldn’t want to call it heaven,” Trumbull said, “just something suggesting this amazing, crystalline, pure energy form.” As far as the crew was concerned, however, the environment was heaven, and the floating forms within it were angels. Whatever the proper terminology, the awesome, climactic Death Tape scenes represent *Brainstorm*’s ultimate display of special effects prowess.

First came the creation of the chief residents of this space — floating streams of diaphanous figures. At its basis was a single human figure. “We used a dancer, Susan Kampe, with about fifty yards of china silk attached to fishing rods,” Trumbull said, “backlit and photographed in the parking lot, going through wing-like flying movements. It wasn’t a bird or a plane; it was just an organic *thing*, photographed at about 96 frames a second.” From that solitary silk dancer, vast streams of angelic figures were to be generated — in rivers that twisted and turned on invisible paths, moving towards a single source of incredibly bright light — a light to which the consciousness/point of view seems irresistibly drawn. “In each of those shots,” Trumbull explained, “there’re at least six hundred and fifty or seven hundred rear-projected images moving simultaneously, all in slightly different trajectories. It’s like a big shot in one of those cast-of-thousands battle scenes — zillions of souls, or entities, or whatever, all headed off towards this beautiful light.”

Each of the heaven shots features four to six streams of angels — each, in turn, comprised of at least 120 separate images shot on Compsy. The job was huge. “From the original footage of the dancer,” said Baker, “they picked out three rolls, and each roll had about two thousand good frames

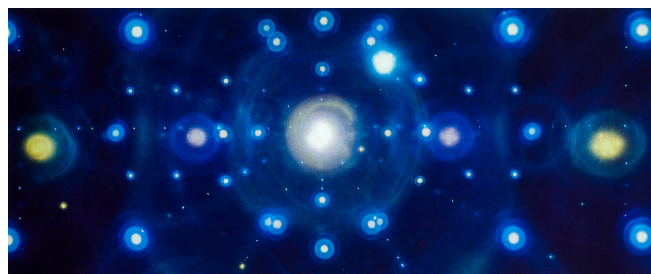
on it. Each shot was about four or five hundred frames long, so we could theoretically get four or five passes off each roll before we had to rewind and start over. But Doug didn't want it to appear as though we were recycling the same footage, so with each new pass, we'd stagger and jump around the film, trying to make it as nonrepeatable as we could." Even here, time was of the essence. Compsy could be programmed to handle many hours of filming without interruption — angel shots usually ran up to sixteen hours without stopping — but it was still critical to save every possible minute. "We could save several minutes by not running all the way back, which took fifteen to eighteen minutes for two thousand frames. I ended up shooting forwards and reverse and doing every little trick I knew to save time."

Richard Hollander would plan out the movements of the angels in advance, with mathematical precision. "Each angel had its own individual motion, and then we'd have a total move on top of that — a simulated camera move through these rivers. We had to build our own grid system, just to place these rivers in space, and then place each angel on the river. They were being very critical about placement, so we came up with this grid system that Alison could use to show where she'd want an angel. That would correspond to a number that we could relate to the camera moves and camera position. It was pretty incredible — we had rows of little checkerboards, little dots in them. Then, once we had them all laid out in a spatial relationship, we had to go back in and add the camera moves. The grid only represented one river in a static position; but the whole river would need to animate and slowly twist and bend, and *that* motion would then be overlaid on the total camera move. It got pretty complex."

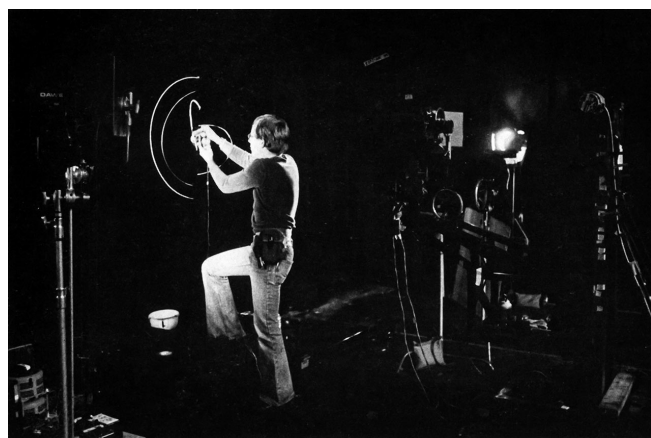
In the final shots, there is very little overlap of the angels. Partially that resulted from extremely careful placement; but additionally, the angels were shot with mattes for the better part of the run.

"Everybody was concerned with the blacks going to gray," Hollander recalled. "And then we were surprised to see that they put this very bright background on that wiped out any old gray that was there altogether. The big bright light wipes away massive numbers of angels, too — hours and hours of work. If you could only know what it's going to look like in the end, you could really optimize your work. But that never seems to happen."

The bright background itself was a matter of very careful design. "The thing I was trying to do was based on some images I remembered from reading *Paradise Lost*," Trumbull recalled, "of this heaven-like place where there were these rivers of souls — entities of some kind, not really angels, just organic shapes. And when I thought of these shots about three years ago, one thing I knew was that the final color timing, the brightness printing of those shots,



Next, the camera passes through a figurative microcosm of atomic particles.



David Hardberger takes a light reading off a wire rig, connected to a double-axis rotating mechanism. During photography, the camera shutter remained open as the

would make them a success or a failure. When those shots are so bright — almost white on white — they're very successful. But you have to find that zone. It's just one or two printing points, one way or the other."

mechanism made one or more full rotations — in the process building a three-dimensional shape from the accumulated exposure.

Jerry Morawski was called upon to generate the heaven backgrounds. An artist who specializes in creating light art, Morawski provided the strange, spindly light sculptures seen in the far distance. "The general technique has been around for quite awhile," said Morawski, "going all the way back to some twelfth-century monks who used to light services with candles in glass. Basically it involves taking a beam of light and passing it through an aberrational medium of some sort and then recording the distortions that result. What I've been able to do is perfect a system of assembling different textures and designs — and, in some cases, constructing symbolic images. There are various ways light can be modified. You can bounce it off reflective surfaces, you can pass it through glass or lenses, you can bounce it off liquids that have been linked to a sonic device that sets up differing patterns depending on the type of liquid you're using. I use all these techniques, plus more, in my work. What I tried to do for *Brainstorm* was create a slice of heaven, and in the process I came up with hundreds of images — from alien forms and animalistic characters to landscapes and various kinds of abstract imagery — only a few of which were actually used in the film."

"We used one basic image for each shot," Yerxa explained. "But there were generally three or four of Jerry's 8x10 transparencies that looked very similar that we were able to cross-dissolve to get a little more life into the image. Then John Wash did a lot of line drawings that followed the basic form of the light structures, and then did moire patterning over those with a little flare — so it wouldn't just be static back there. It was supposed to be a birth canal sort of imagery, with light at the end."

The light, too, was the creation of John Wash. "I used the brightest little quartz light we could find, and it produced the biggest lens flare I've ever created. In fact, it was so incredibly bright that it was bleeding over the edge of the frame into the next frame. In order to get around that, we shot a black frame in between every other frame, and then optically skipped all that black out. That way we got a cleaner image." Though the angels were inserted later optically, the background itself was composited on the Oxberry. "It was a matter of putting in a number of Jerry's passes, the fine-line drawings based on major elements that were moired with a bunch of filters — two or three layers of that — and then the light on top. It took four or five passes to get all the different elements."

And there is even more in the final shot. "Way in the back," Trumbull said, "there is sort of a huge face — really multiple faces. You look at the original



Light bounces in the gallery of shafts, the longest reflecting off walls, glassing out of danger, so, as it is, in high, low, and in, glowing, and off, and light grows older. Plants, including digital, change lips, affect the soft, light, and make a light on. A temporary and the diaphanous flowers. A light was taken and done and broken, and transparencies — some of which were cross-dissolved and enhanced with moiré patterns to give them an apparent life of their own. A giant, flaring light source completed the illusion.

Shadow & Substance

article by

Don Shay & Paul Sammon



There is a fifth dimension, beyond that which is known to man. It is a dimension as vast as space and as timeless as infinity. It is the middle ground between light and shadow, between science and superstition, and it lies between the pit of man's fears and the summit of his knowledge. This is the dimension of imagination. It is an area which we call the Twilight Zone.

Twilight Zone — The Movie which closes with Rod Serling's distinctive intonation of the opening narrative he had used for his landmark television series some twenty years ago — was conceived by co-producers Steven Spielberg and John Landis as a means of paying tribute to a seminal influence in their lives, at the same time expanding the *Twilight Zone* concept into a feature film worthy of Serling's enduring vision. Retaining the series' anthology format, four preeminent young filmmakers would each produce a separate story, faithful in style and — with one exception — adapted by series veteran Richard Matheson from classic TV episodes.

"Originally," said director Joe Dante, "John, Steven and I were going to do one episode each — with our own crews, which is something that hasn't been done too often. John wanted to do one of his own stories, but Steven's first thought was to remake 'It's a Good Life,' about the little kid with truly awful powers. That's the segment I ultimately inherited. A bit later, George Miller was visiting from Australia, and he happened to be sitting in on a meeting one day with John, Steven, myself, Richard Matheson and some reporters from 20-20. And Steven was saying: 'The *Twilight Zone* movie should be great! It'll be just like the old days, with every director doing exactly what he wants. And hey — there's George! George, why don't you do one?' So George got to do one. You had to be there — literally. He ended up doing 'Nightmare at 20,000 feet' — mainly because Steven claimed that, as a kid, when William Shatner opened his plane window in the original episode and saw this creature staring back, it was the most terrifying thing he'd ever seen. He kept going around saying, 'We've got to get this on the screen.' But, actually, he didn't want to do that episode himself, either. So George did it."

Although the exact order and nature of the film segments was still to be determined, a basic framework had been agreed upon, and in the early summer of 1982, cameras began to roll on a prologue which would serve as pre-credit introduction to the film. Titled "Really Scary," the mini-

segment was both written and directed by John Landis. Basically a campfire story, the Landis prologue is a relaxed practical joke, a laid-back ghost story with a sting in its tale. Following two travelers on a dark, deserted road, Landis leads them into a spirited trivia game involving old television theme songs — *Perry Mason*, *Sea Hunt*, *Bonanza* and, of course, *The Twilight Zone* — before Dan Aykroyd asks traveling companion Albert Brooks if he'd like to see something *really* scary. Brooks says yes, and moments later, Aykroyd transforms himself into a hideous monster.

Good-natured and humorous, "Really Scary" is the perfect setup for the more serious *Twilight Zone* episodes to follow. Shot in two nights in the Malibu Mountains, the mini-segment — according to Craig Reardon, who designed Aykroyd's monster makeup — began with quite another performer in mind. "John originally wanted Rick Baker (who won the first "regular" makeup Oscar for Landis' *An American Werewolf in London*) to be the character played by Dan Aykroyd in the film. Aykroyd, in turn, was supposed to be the Albert Brooks character. Actually, I think it was an inspiration to finally get Albert, because he and Danny worked very well together. But in the beginning, what John wanted to do was to have Rick Baker turn into some character of his own design. The problem was John couldn't spring him away from the *Greystoke* project, not even for three days. At that point, Rick recommended me as an alternative makeup man, and so John hired me on for the prologue. His first thought was to liberate an old mask of some sort for Aykroyd to wear when he becomes this whatever-it-was — the creature wasn't visually pinned down in the script. In fact, all it said was, 'He turns into a horrible monster and tears the head off the driver.' John began thinking he might just use one of the Nazi werewolf masks from *American Werewolf*; but I thought that that might have too many associations, not only with that movie in particular, but that also, out of context, it might look like a Halloween mask. So I said, 'Listen, John, I have something that I did for *Poltergeist* that they decided not to use.' It was kind of a screaming blue ghost, and I showed him a picture of it."

Landis liked the offbeat look, and soon thereafter gave Reardon the go-ahead. The next step was a session with Dan Aykroyd. "We did a typical life cast of him, except that I pulled his nose up into more of a *Phantom of the Opera*-type configuration, held it there, and then took the life mask so that that look could be incorporated into the final product. Then I took the life cast and sculpted directly over his features in plastilene, putting a lot of heavy wrinkles on him to get kind of a dried apple look. From there, it was a simple matter to make a foam mask. I decided on a mask, by the way, because my feelings were that neither John nor Dan would be crazy about my spending a couple of hours getting him into a more elaborate disguise. There was no particular subtext or discussion of the history of that creature. I just had this nasty apparition I hadn't been able to use in *Poltergeist*, and I took that as a departure point. We even used the same kind of bluish face. I told John we could change the skin color if he wanted, but he said, 'No, go ahead and make it blue.' In putting it on, we pulled Danny's lower eyelids down by affixing the skin under his eyes to itself, so that his eyes would droop open horrifically and show the outer orbits — rather like Lon Chaney did, using two wire monocles, for *London After Midnight*. Also in the *London After Midnight* vein, we had a set of sharp, pointed teeth for him to wear. For those, we began by taking a cast of Danny's teeth — just as an orthodontist would — with a little dental tray filled with an alginate material that gels in about four minutes. With that, you have the equivalent of a rubber mold from which you can cast replica teeth. The character teeth are then sculpted in clay right over the replicas, and another mold is made of that, from which the finished denture can be cast in hard dental acrylic plastic. We also

had some long fingernails for him. The whole idea was very broad — almost silly, in a way. My feeling was that the creature should look frightening — but then again, it wouldn't be too bad if the whole thing were also a bit tongue-in-cheek. John felt the same.”

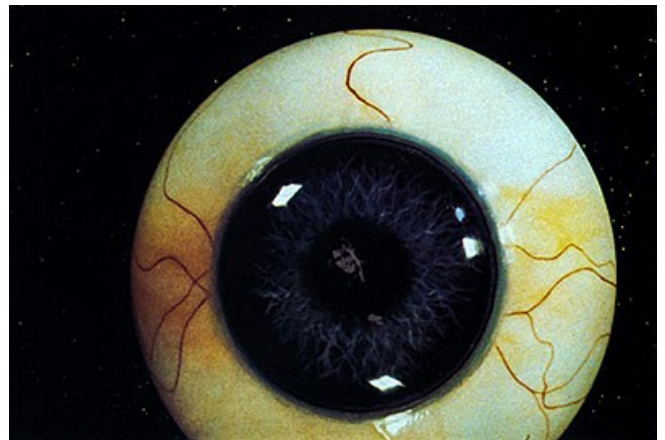
On the night the makeup was to be shot, Reardon accompanied the main unit out to the Malibu Hills site, and was dozing off around five in the morning when the call came. “I took Dan Aykroyd, plopped him down and put this mask on him in about twenty minutes, which is very fast for an elaborate makeup job. I was assisted by Bob Westmoreland, who was doing the normal makeup for that episode. We just really went to it. Then John snatched him up and took him to the location a couple miles down the road. They wanted to shoot it before sunup — but unfortunately, it was already so late that the sun was beginning to break, and so they had to tent the car to actually get the shot.”

Leaving Albert Brooks in the clutches of something really scary, the camera tips up into the by-now familiar *Twilight Zone* starfield as the equally familiar “doo-doo-doo-doo” theme thunders on the Dolby soundtrack. What follows is a quick succession of images set against the starry vastness of space — images recognizable from the opening credits of the TV show's fourth season, updated and segueing into the film's main title.

Although Industrial Light and Magic had initially been considered as a likely candidate for the *Twilight Zone* titles, it quickly became apparent that the Lucasfilm subsidiary, already overtaxed with *Return of the Jedi*, would be unable to absorb any further commitments. Other sources were therefore investigated, with the overall responsibility eventually falling to Peter Donen of Cinema Research — a company specializing in titles, opticals and other effects. Donen — whose prior feature credits include *Outland*, *Altered States* and the *Superman* trilogy — was first approached regarding the *Twilight Zone* credits by the film's executive producer. “Frank Marshall came to me with an original title sequence for the show and said: ‘Look, this is the main title from one of the first seasons. We want our titles to be very 1980s, but we also want them to be faithful to the original series.’ And that turned out to be our biggest problem — being modern, but keeping faithful. If you look, for example, at the figure of the man floating through the original TV titles, you'll see that all they used was a twelve-inch-tall artist's dummy, onto which they put nylon hair — you can even see the string holding it up. And it just sort of floats



The Twilight Zone title sequence — an updated reconstruction of the series' opening — was produced under the supervision of Peter Donen at Cinema Research. For the film, the artist's mannequin employed in the original was stylized further into vector graphic form and computer-generated by Gehring Associates.



In a subtle nod to the Twilight Zone's creator, a reflected still image of Rod Serling was superimposed fleetingly onto the drifting eyeball just as it passes out of frame.

through the starfield, left to right. So one of the things we tried very hard to do for the *Twilight Zone* film was to get dimensionality, originality and depth into our titles.”

Although coordinated by Cinema Research, the various objects appearing throughout the main titles were actually built and photographed by a number of different firms. These, in turn, were composited over a multiplane starfield. “The starfields were shot here on our computerized animation stand,” Donen explained, “using some existing artwork that had been floating around for years — dating back, I think, to Universal’s *Buck Rogers* days. The shimmering nebula at the beginning — in the starfield — was generated for us by Novocom. Basically, it was a number of moire patterns that were animated across in about seven different passes.” Novocom shot the shattering window, the floating eyeball, the $E = mc^2$ symbol, the pendulum clock and the words *Twilight Zone*. Gehring Associates created the computer-generated swimming man, while animated ripples for the figure to break through were done by freelance animator Sari Guinness. “The *Twilight Zone* words themselves,” Donen elaborated, “were shot at Novocom, but the artwork was prepared at Cinema Research. Each group of two letters was animated independently to give it an unstable floating appearance. For example, the letters ‘TW’ were in one group, ‘IL’ in another, and so on. In all, there were six different animation groups involved in just those two words. The $E = mc^2$ symbol was all short-stroke streak animation moving in perspective, with moire patterns also moving across the front face to give it life. That was also done at Novocom. There were also other individuals and companies involved — about six or seven of them, in fact. Greg Jein built the door, a miniature about two-and-a-half feet tall; and a company down in Orange County made the window. That window was actually a composite done on two pieces of tempered glass — about twenty by twenty-four inches in size — one of which had the window itself painted on it, while the other, behind it, had the daliesque landscape. We used tempered glass, by the way, so that when it was shattered, it would crumble and not fragment.”

Perhaps the most curious aspect of the opening credits concerns its drifting eyeball. “Beverly Hoffman, the lady who made E.T.’s eyeballs, made that eye for us,” Donen explained. “It was about seven inches in diameter. I don’t know if anyone notices it, but Rod Serling’s reflection is in it. We spent weeks looking for just the right photo — the quintessential Rod Serling photo, of him standing with a cigarette, smiling and looking at the camera. Finally, Carol Serling, who had one like that hanging in her home, was kind enough to loan it to us. We rephotographed it through a fisheye lens to bow the image and make it look as though it were the right shape to appear reflected on an eyeball. Then we put it on a motion control stand and plotted it so it would slide across the eye like a reflection — and that’s in the last eighteen to twenty frames of the shot. It just barely goes through. It was a bit of an in-joke, really — as much for the guys who worked on the film, and for Carol, as it was for anything else. The whole idea was Steven’s, by the way. He asked for it.”

Twilight Zone’s end titles, featuring a multiplane starfield and a comet racing across the heavens, were also generated at Cinema Research. “Those end credits were almost five minutes long, which meant that we had to do a five-minute-long multiplane starfield to support them. In addition, transitional star-fields were done for *all* the different segments, to hook up the outgoing and incoming episodes, but eventually those went by the wayside. The idea was to bridge the episodes by going up into the starfields and coming back down again, but every time they did it, the film came to a crashing halt. So those were discarded, except for the one following the final sequence. In

that one, the camera pans up off the ambulance, right on up into the heavens. Then the starfield turns a corner and starts moving away.”

A brief narration by Burgess Meredith opens the film proper and leads into the first major segment. As written and directed by John Landis, “Time Out” details the fate of one William Connor, an incorrigible bigot who indiscriminately derides Jews, blacks and Orientals — until he abruptly finds himself a mistaken representative of each group in a nightmarish succession of episodes taking place in the Paris of 1941, Mississippi in the 1950s, and Vietnam in 1967. Tragically, on the final night of shooting, lead actor Vic Morrow and two child performers were killed in an on-set helicopter crash. Numerous investigations ensued; and for the next ten weeks, it was uncertain as to whether production on the *Twilight Zone* film would continue. Then shooting recommenced with Joe Dante’s remake of “It’s a Good Life.”

Although the Dante episode was the second to be filmed, it was Steven Spielberg’s episode that would ultimately follow “Time Out” in the final assemblage. But — having passed on the possibility of remaking “It’s a Good Life” and “Nightmare at 20,000 Feet” — exactly what that segment would be was undetermined for quite some time. “At one point,” Dante recalled, “Steven was all set to do an original Matheson script about a bratty little kid who causes a lot of trouble on Halloween, until the tables are finally turned on him at the end. Things got very weird at the climax, and there would have been a lot of special makeups and effects involved. Maybe because of that — after all, *Twilight Zone* was only a moderately-budgeted film — and the fact that an entire city block would have had to have been built for the segment, Steven abandoned the idea and took up ‘Kick the Can’ instead.” As a result, Spielberg’s episode was the warmest and most gentle of the *Twilight Zone* segments — a sentimental argument for the preservation of a youthful spirit, even in the face of old age.

Originally, it was felt that the film should have a series of linking elements, but as the production progressed, these were ultimately discarded. “The film would have begun as it does now,” said Dante, “with the guys in their car talking about the old television show. But then minor characters in one person’s episode would become major ones in another, and vice-versa. When Steve was still planning to do his Halloween story, there was a big chase at the end, which would have linked up to mine when the camera suddenly pulled back and you saw that the chase was actually part of a video game being played by the kid at the beginning of my story.” At another point in the production, “It’s a Good Life” was slated to follow “Nightmare at 20,000 Feet.” “I think the Kathleen Quinlan character in my episode lost something when it was decided to put George’s episode after mine. Originally, the ambulance taking John Lithgow away from the plane goes past the hospital, just as Kathleen is leaving with a friend. Her mother has just died, and she is giving up teaching. All she wants to do is go out in the world and learn things. This was all shot, but we had to cut it out when the episodes were shifted. Now ‘It’s a Good Life’ opens with the Burgess Meredith narration over what was originally the second scene of my episode.”

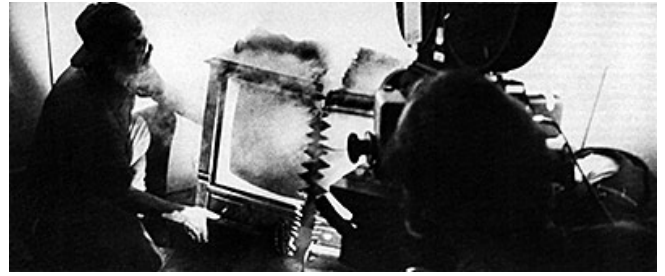


The punchline to the film's prologue comes in the unexpectedness of actor Dan Aykroyd's instant transformation. Effects makeup artist Craig Reardon — who designed and fabricated the monster mask — adds a final bit of blending around Aykroyd's eyes.



For Joe Dante's remake of "It's a Good Life," effects makeup designer Rob Bottin created a unique makeup concept for Anthony's once-outspoken older sister — played by actress Cherie Currie.

What follows is an alternately comic and frightening tale, the most highly stylized episode in the film — a story about a cartoon-obsessed little boy (Jeremy Licht) whose every wish comes true. Working in close collaboration with Richard Matheson, Dante developed a screenplay quite removed from the original TV episode on which it was based. “Though the first ‘Good Life’ was marvelous, it was also static. Nothing changed throughout the story. It was also pretty grim and downbeat. So we decided to develop little Anthony’s influences around television and cartoons. I love cartoons. We also added Helen Foley — the Quinlan character — as the person through which the audience could experience this weird situation.”



Eight televisions — each designed for a different effects gag — were fabricated in Bottin’s shop for the sequence in which the family TV begins to jump around and then splits apart in a burst of pyrotechnic fury.

Beginning with the diner sequence where Helen rescues young Anthony from a bully, Dante’s episode is the most in-joke ridden of all the *Twilight Zone* film segments. “Everything is a joke within a joke,” said director of photography John Hora, who had worked previously with Dante on *The Howling*. “Joe added so many layers of humor and meaning and cross-references, that you could spend years trying to figure them all out.” In addition to peppering his cast with seasoned veterans from the original TV shows — including a cameo by Bill Mumy, the original Anthony — Dante incorporated numerous dialogue and location references, as well. Helen Foley, even, was the name of an actual teacher of Rod Serling’s.

Taking Anthony under her wing, Foley drives the boy to his home — a quasi-Victorian structure actually discovered in an otherwise normal Granada Hills neighborhood. Though unconventional in appearance, the vintage house was commonplace compared to the interiors conceived for it by production designer James D. Bissell, and constructed on Stage 15 at The Burbank Studios. “The idea was,” said Dante, “that if you were an eleven-year-old and could design a home, maybe you wouldn’t understand enough about plumb lines to get your angles straight.” Dante also let a house in a Chuck Jones cartoon, *Mouse Wreckers*, influence the final conception. “In fact, the first shot that you see on a TV set in my episode is that same house from *Mouse Wreckers*, reanimated for the film. The matchup between that cartoon house and the place we found in Granada Hills — which, incidentally, was surrounded on all sides by apartment houses and ranch homes — was uncanny. The interior of the house had a lot of things going on in it that weren’t overly apparent. For example, the stairway was designed in a forced perspective so the steps would get shorter at the top. It was impossible to walk up those stairs gracefully. But that was all right, because I had decided that the house needed that kind of outrageous unreality and color.”

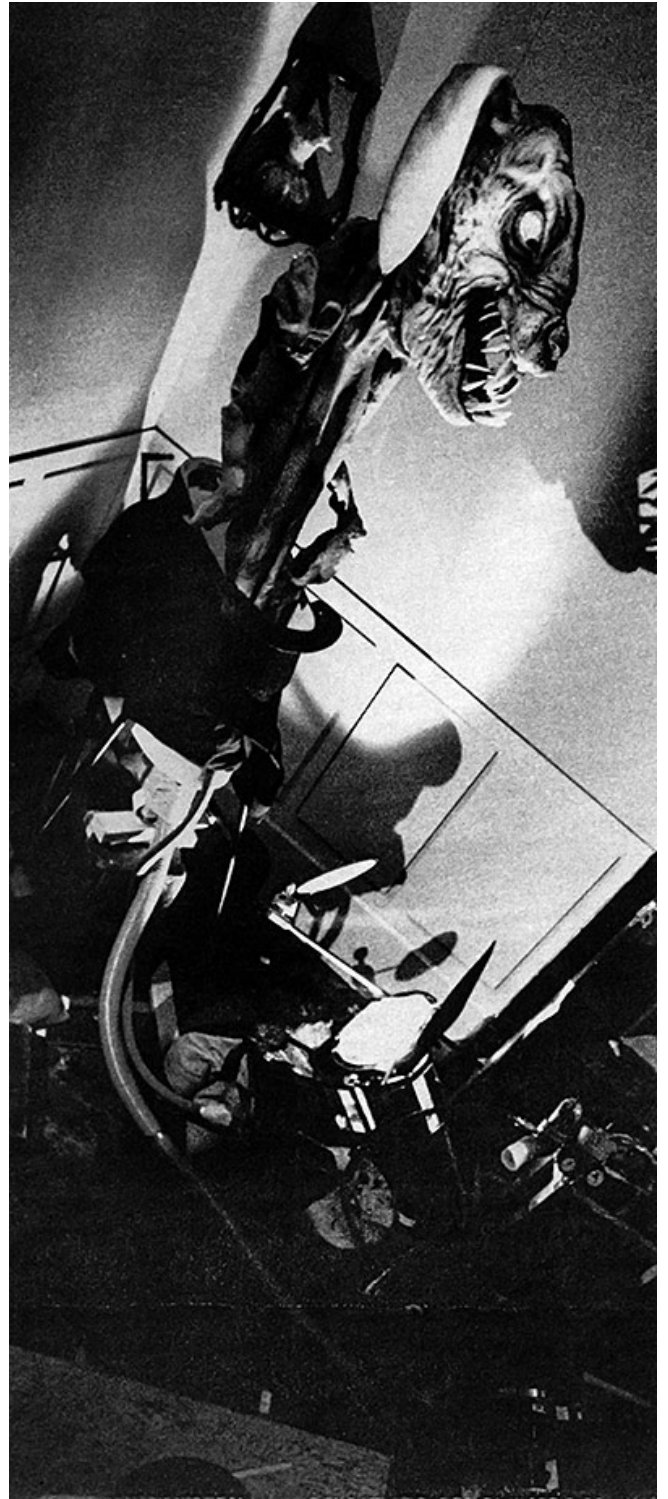
For John Hora, photographing Anthony’s home was an exercise in unorthodox film technique. “Once you’re inside the house, there are no real windows — only painted ones with cartoony scenes of cows grazing and things like that. But we decided that just because there were no true windows for light to come in, that that didn’t mean we couldn’t have sunlight pouring onto the floor. The basic idea of the story was that because this incredibly spoiled kid has such unusual intellectual powers, no one is able to discipline him. As a result, everything about the house is also totally without discipline, in terms of color and form and lighting. If, for some reason, he wanted a shaft of red light

coming down the wall, then that's what there was. So even though there were no windows, we started making up window patterns and projecting light in just as if there were windows in the kid's imagination. I'm afraid the crew thought we were all nuts. We also carried that over into the rabbit trick, where the room is dark and then suddenly a spotlight turns on. What could be more illogical — especially when the woman turns around and there's no spotlight?"

Since television was a pervasive influence in Anthony's home, functioning TV sets were incorporated into a vast majority of the shots. Photographing the ever-present cartoon footage without the raster roll characteristic of filmed video was accomplished through the use of a foolproof system developed at The Burbank Studios for transferring normal 30 frame-per-second video to 24 frames per second and then playing it out in sync with the production camera.

"We did a ton of cartoon research on this project," said Dante. "Sally Cruikshank, who is very well known in animation circles for things like her *Quasi at the Quackadero*, also did some original animation for us, for the sequence where Nancy Cartwright is projected into the television and eaten by a cartoon. And then we had a lot of instances where either the dialog or visual action of a cartoon playing on a TV set was aping the dialogue or visual action of the real world. That was tough. We had a video command post on-stage that was feeding in the various cartoons while we were filming. What was even tougher, though, was getting the actors to act in sync without actually watching the television. It was complicated, but that kind of sync with action, dialogue and music was necessary to me. Otherwise, you would just assume a randomness to the cartoons, when in reality, there's supposed to be a definite connection between what is going on in Anthony's head and what he's making happen in the real world. So first we had to find the cartoons we wanted to use. Then Richard Matheson and I would try to invent a situation that would correspond to them. It was cartoon first, situation second, for the most part."

It is in the segment's frenzied finale, however, that Anthony's true powers come to the fore. For the elaborate mechanical and makeup effects Dante anticipated would be necessary, he turned to Rob Bottin, who had worked similar wonders for him on *Piranha* and *The Howling*. "Every time I've ever worked with Joe," Bottin remarked, "we never seem to go in with anything definite in mind. On *Twilight Zone*, he just sat me down and said: 'Do you have any ideas? Do you have any bizarre things you'd like to do?' We're both old fans of the show, and we talked a bit about the story — which I've always thought was one of the best episodes — and he said: 'Why don't you go home and think about it.' So I did, and I came back with a list of about thirty things I thought we could do — mostly gags and funny stuff. He wanted to keep it light — nothing too scary or disgusting. One of the things we came up with was the idea of cartoon characters coming out of the TV set. I'd seen a Gahan Wilson cartoon in *Playboy* where this little boy is playing a video game with his father, and you see the TV set has exploded and these little Cylon guys are jumping out and the father is sitting there charred like an overdone piece of bacon — and the kid turns to his mother and says, 'Dad lost.' For some reason that really struck me funny, and it was from that that we developed the idea of a cartoon character coming out of the TV. After that, I pretty much knew what I wanted to do — a Tex Avery-type thing that comes out with its legs spinning like crazy and its tongue hanging down and eyes popping out, and whistles and oogle horns and stuff like that."



To execute Anthony's singular variation on the rabbit-in-a-hat trick, Bottin and his crew constructed two five-foot rabbits with decidedly nasty dispositions. For the startling emergence, the first rabbit — a collapsible version — was stuffed into the prop hat and then quick-inflated with an air cannon.

“Before Rob designed the creatures,” said Dante, “I ran Tex Avery’s cartoon *The Cat Who Hated People* for him, which has a lot of eyes popping and jaws dropping. So that was definitely an influence. Also, Rob has a fixation on the work of an artist for *Kar Kulture* buffs, Big Daddy Roth. Roth used to draw these bizarre characters with huge heads driving tiny cars, and during the mid-Sixties, they were everywhere. So, as a result of Rob’s cravings for these things, there’s a lot of Roth’s influence in the designs for our *Twilight Zone* creatures.”

Rampaging cartoons, however, were not to be the first evidence of Anthony’s peculiar powers.

Upstairs, a young woman with no mouth — actress Cherie Currie in a Rob Bottin makeup — bears mute testimony to the folly of speaking out against her junior sibling. Then later, the disquieting child persuades a reluctant Uncle Walt to perform his celebrated hat trick. “The rabbit coming out of the hat was my favorite,” said Bottin. “That was inspired by Rocky and Bullwinkle. Bullwinkle was always saying, ‘And now, I’ll pull a rabbit from this hat,’ and instead he’d pull out a lion or something — ‘Oops, wrong hat.’ So that’s where it came from. Nothing new in Hollywood. When we talked about the rabbit, Joe said he wanted something creepy — not disgusting like the stuff in *The Thing*, but not funny like a cartoon. The idea was to come up with a sinister, sneaky, evil-looking rabbit. I did three or four sketches, and finally came up with the one we used. Originally, I wanted to put hair on it — in patches, like some giant diseased rabbit — but time ran out.”

Reassembling the foremost members of his crew from *The Thing*, Bottin set to work on two versions of the fearsome five-foot rabbit — an articulated mechanical version suitable for close scrutiny, and a lightweight inflatable version for the scene where it actually bursts out of the hat. “I had this air cannon device that Doug Beswick built for me on *The Howling*. You put your compressed air into the cannon, which has a quick-release valve and solenoid to let the air out — and you can figure out that a certain amount of air will fill up a certain amount of space, so you can get a quick inflation without worrying about it popping. As a test, we took our rabbit balloon and shoved it down inside this hat and pushed the button. The rabbit popped up, inflated perfectly, and then tipped over and fell down — which was discouraging because we were getting close to filming. I figured the balloon must be too heavy, so I had the guys pour up another one that was lighter, and then Dave Kelsey had the idea of using helium to keep it upright. So we filled the new rabbit with helium, and it



Joe Dante makes a minor adjustment to the second rabbit, an articulated version capable of limited body movement and a full range of facial expressions.



Actor Kevin McCarthy recoils in terror as the snarling monster rabbit lunges out of its hat.

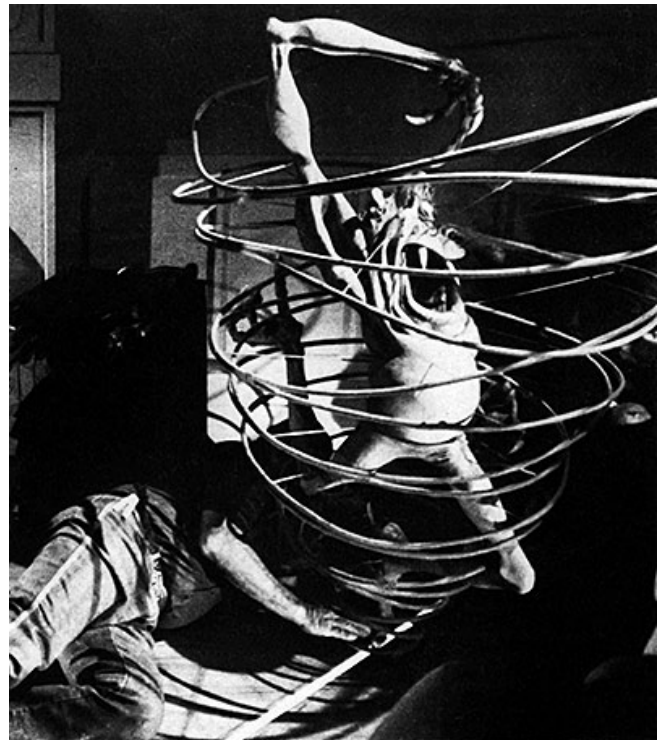
worked. It stayed up and it floated and we put little weights on the arms to balance it out. It was great. So here we are with this giant rabbit floating in our doorway — like something from the Macy's parade — and I decided we had to have a picture of it. Dave said he'd hold it while I went to get my camera, but I told him it wasn't necessary because the thing was just floating there — which was true. The trouble was, the little fishing weights that we used to stabilize it were fastened on with duct tape, which unfortunately didn't stick very well to the rubber. I got back with my camera and the rabbit was gone. I started looking around, and then Dave Kelsey points up in the sky and there it was, drifting away over Van Nuys. Some kid probably has it in his room now. What made it especially bad was that we didn't have time to make another one, so we had to use the original balloon with the cannon and a few wires on fishing poles to make everything stand up right. We also shot some smoke up through the hat when the rabbit came up. It wasn't the greatest effect. In fact, it was pretty embarrassing — especially since I'd told Joe and everybody how great it was going to be. For a quick cut, though, it seemed to work okay."

Once the pop-up was completed, the inflatable rabbit was quickly replaced by its mechanical twin. "The hat was floating with suspension bars and cables," Bottin continued, "and we had a spring steel rod going up through the rabbit. The rod was rather long, so we could stand below the camera and shake it to make everything vibrate. The arms were real rubbery, so they wobbled a lot. The head movements were controlled with cables and a couple of rods coming out the back and into the set. The jaw opened and closed, and it had a snarl mechanism around the lips which required about twenty cables to operate. I wanted to put a tongue on it that would come out and lick Kevin McCarthy's face, but we didn't have time. The ears were just marionetted from above. During one take, we had a wire break unexpectedly, and one of the ears flopped over. Joe thought it looked pretty good, so he cut it into the picture."

Following hard on the heels of the slaving rabbit, sister Ethel is devoured by one of Anthony's television cartoons. "Getting Ethel into the TV was never quite resolved," said John Hora. "Unfortunately, the best idea came up too late, and that was to make a full-size balloon of her and then let the air out so it would shoot across the room right towards the television. If we'd thought of that in time, and had the money, we could have done it — which I think would have been a real funny way to banish her into video land. But as it is now, she just pops in. There's a cartoon sound cue, and she's gone." For the scene where Ethel was actually consumed by one of Sally Cruikshank's animated creations, actress Nancy Cartwright was filmed on a treadmill in front of a blue screen. At the point where she was to be gobbled up, the camera zoomed back and a blue card closed over her image. The bluescreen footage was then composited into the menacing cartoon and transferred to videotape for playback on the set.



Chaos reigns when Anthony conjures up a giant three-dimensional cartoon character. Joe Dante examines the periphery of his set in preparation for a shot of the creature's first manifestation — a twisting tornado of light, achieved by surrounding the central fiberglass and rubber figure with Scotchlite-covered hula hoops and then front-projecting yellow light onto them as the entire assembly spun across the floor.



Between takes, Bob Worthington replaces smoke bombs concealed on the rings' inner surfaces. A drive mechanism, attached to the creature's foot, extends down through the slotted floor to a motorized cart below.

Terrified, Helen Foley attempts to flee the house, only to confront a hugely distorted eyeball blocking her escape at the door. “One of our biggest unsolved mysteries,” said John flora, “was what was going to be outside the door when she runs over to it. The eyeball idea was presented immediately, but because an eyeball was in the opening — and was kind of a signature for the show — we preferred to go with something else. We thought of a giant vortex and other frightening things to keep her from going out; but in the end, nothing seemed to work quite as well as the eye. So we did an anamorphic eyeball, and luckily the shot was short enough so that it does kind of seem like another monster looking in — it doesn’t read like a piece of film. The live action was shot with wind machines and orange light so that when Kathleen opens the door against the blue screen, there was kind of a storm effect.”



Dante observes as the whirling construct progresses along its predetermined path through the living room. Severely undercranked for maximum speed effect, footage for the sequence was shot at one frame per second.

Next, the television begins to jump and quiver, before splitting apart in a burst of pyrotechnics. “We made about eight TV sets to be able to pull off what you saw on film,” said Rob Bottin. “One floats and dances; another splits open and a claw comes out — which is hard to notice, because everything’s vibrating so much. Smoke and steam shoot out of one of them. We used hydraulics, air rams, pyrotechnics — everything. My studio looked like a TV repair shop.”

The shattered set then disgorges a huge distorted cartoon character which spins across the floor in a tornado of light and smoke, tearing through the sofa and coming to rest before the aghast members of Anthony’s household. The whirling dervish effect — an unacknowledged tribute to the Tasmanian Devil — was accomplished entirely on the set. “Everyone thinks it’s an optical,” said Bottin, “but it wasn’t. I’d seen displays for Michelin tires where they have two tires fastened together at an angle — and when they’re rotated, it creates an interesting effect. I thought something like that would be perfect for us. The creature inside was basically a fiberglass dummy, with a few movable rubber parts so it could do things like hang its tongue out and wiggle its ears. Then we took some hula hoops, altered them to various sizes, and mounted them around the figure, with larger ones on the top and smaller ones at the bottom. Bob Worthington was in charge of that project. He did the head that comes off in *The Thing* — the part where it slides onto the floor and crawls away.”

To facilitate Bottin’s visual trickery, the living room set was built six feet off the ground, allowing plenty of room underneath to operate a variety of mechanical devices. In this particular case, a sled-like cart was placed directly beneath an inch-wide slit in the floor, allowing a turntable-type mechanism on the cart to be connected unobtrusively to one of the creature’s feet. Tiny smoke bombs attached to the rings were ignited electrically, and the spinning figure was drawn slowly across the set. “There was an electronic break that could stop the figure very quickly,” Bottin explained, “and it had a timer on it so we could tell exactly when it would be facing the camera. When Joe said, ‘Stop,’ Bob would punch the button, and it stopped perfectly every time. Then they’d pull a ring off and start it up again. The way the rings were mounted, they wobbled back and forth, which meant that we didn’t even have to go back and composite to get a double image.”

To achieve the glowing whirlwind effect, Scotchlite tape was applied to the hula hoops. The scene was then photographed through a beam-splitter, with yellow light front-projected onto the rotating rings. “We shot that at about one frame per second,” John Hora recalled. “The figure took something like ten minutes to work its way across the floor and through the sofa, and lots of times it would only make it about two-thirds of the distance and then bind up. So we’d have to go back and start all over again. We ended up spending all of one day, just getting three takes on that thing.”

The sofa through which the spinning creature was to pass — also constructed in Bottin’s shop — had been designed to pull apart in the middle by means of monofilament line manipulated manually from off-camera. With the frame rate being used, it was virtually a stop-motion situation. “We didn’t want it to look like it was just being pulled apart, though,” said Joe Dante, “so we ran a reverse vacuum hose stuffed with feathers into the couch so that when the thing passed through, this cloud of feathers would fly up into the air. Unfortunately, we were shooting at such an incredibly low frame rate that the things invariably shot up and dropped down between frames. You never saw *one* feather. And the set was literally *covered* with them!” To sweeten the shot, and camouflage the sofa break, Visual Concept Engineering was later called upon to provide a bit of supplemental smoke animation for the pass-through.

The spinner was to be only the First of Bottin’s cartoon manifestations. “We did five creatures, all of which were supposed to be variations of the same character, but that didn’t really seem to come off as a concept. In real cartoons, the characters go through extreme changes. If they get hit on the toe with a hammer, their jaw drops open and their ears stand up like trumpets — they totally change shape, and then they return to their original form. So what I did was come up with one basic character, which had small ears and a big snozzle, and then just took it to its extremes. The problem was that we didn’t have enough time or money to do the in-betweens. If we’d been able to show them going from one form to the next, it would have been much more clear. But we couldn’t, so after the First one spins out and screeches to a halt going ‘wah-de-wah-de-wah’ — typical cartoon sound effects — we went to the next one which puffs out its cheeks and blows a stream of CO₂ across the room to get a cartoon whistle look. You could see the lips extend out about a foot, and we had bladders in the cheeks and ears that rotated. But it was a quick shot, and the way it was framed, you couldn’t really see that we also had it rigged so that when it was inhaling, the shoulders reared back and the chest expanded as it took a breath. The next version had cable-operated lips for expressions, and its jaw could drop way down. It also had smooth-on eyes that expanded — nothing very sophisticated — just guys standing off-stage blowing them up. The ears rolled around and the head totally rotated. So did the body. Then we put prosthetic arms on one of our guys and had him down on the floor doing things with his hands. Next came the version we called Tex, because it looked the most like something Tex Avery would come up with. Archie Gillet engineered it. Unfortunately, you didn’t get to see much of that one either, but the legs spun around cartoon-style, shooting out smoke like tires burning rubber. The shoulders rotated, and its hands turned and stretched. The eyes extended out about five feet on springs, and smoke shot out of its nose and ears. The jaw hung open, scratching against the floor, and the tongue unrolled like a party favor. We had a lot of fun with that one.”



Bottin makes adjustment to the actuating mechanisms for the creature's second form — the only one actually completed in time to be used during principal photography.



In a physical enactment of a cartoon whistle, the creature's cheeks puffed out and a blast of carbon dioxide was directed through its extended lips.



Bottin and other members of his crew surround their third version of the character. A grip, on his knees in front, was drafted into service and outfitted with prosthetic arms which he manipulated in front of the creature during photography.

“The hardest thing about shooting special effects,” said John flora, “is that they’re never ready when you’re working with the actors. On *Twilight Zone*, there were only a few effects shots that were actually done in the body of the production. Everything else was shot later. The only thing Rob had ready to go was the head and shoulders of the one that blows the fog all around, so we were able to tie that in with the actors a little bit. But for the most part, we were always second-guessing what colors would be used and what the creatures were going to be able to do. We weren’t even sure what frame rates we’d be using since most of the postproduction shots were done at nonstandard speeds. In fact, a lot of them begin at one frame rate and then change to another. The rabbit coming out of the hat, for example, started at 24 frames per second and then dropped to 12 frames per second at the end. We had others that went down to 8 frames per second. Norm Cattell, my first assistant, is particularly good at doing speed changes and exposure compensations. For the creature with the spinning legs and the steam coming out of his ears, we were also dollying in, so Norm had to use one finger to follow focus, one Finger to change the f-stop, and then reach his other hand around the camera to make the speed change — all at the same time. Of course, any time you try a shot like that you risk getting a pulsation of one sort or another, so whenever possible, we add smoke or flashing lights or something to help camouflage any errors. Then, if you have people in the scene, their movements have to be coordinated as well. Kevin McCarthy came back in for the rabbit shot, and he did a good job of compensating for the speed changes.”

“Our final character was the most elaborate and expensive one of the bunch,” said Bottin, “but it really didn’t work in the context of the film. The idea was to have it crouched on the ground like some great fleshy tarantula with a Jimmy Durante nose, bobbing and weaving and snarling about — kind of like the Tasmanian Devil when he stops whirling around and starts growling and making hideous faces. The thing was down on all fours, and had hand hands and feet hands. Those were done by having guys underneath the set with their hands stuck up through the floor into prosthetics that blended off into their arms. There were also people underneath working all kinds of facial mechanisms, and other guys down there with cables moving the whole body around. When we set it up on the stane everybody was pretty excited about it. But when we saw it on film, it was



The third manifestation had cable-actuated tips for expressions, a long dangling tongue, eyes that bulged out and ears that revolved.



The fourth featured spinning legs, a grossly distended jaw, eyes that sprang out of its head, a party favor tongue, and smoke blasting from its ears and nose.

just a little too weird. For one thing, it wasn't smooth. We didn't really have time to rehearse it and coordinate everybody's action, and so it was just sort of randomly twitching. But the main thing, I think, is that it was just too bizarre. Somehow it started looking almost human — when it was supposed to be looking like a cartoon. Joe showed me a rough cut of the movie with that in it, but I had a feeling as we watched it that he'd end up cutting it out."

"That last creature was really the scariest monster in the segment," Dante admitted. "But it also happened that it was the most impossible one to cut away to without getting the impression that it was something that had wandered in from another movie. I tried to work it in, but it just didn't fit. We had to cut it." In all, the postproduction effects required two weeks of stage time — a week longer than originally scheduled. "It took a long time to shoot those creatures — which was frustrating. On the one hand, you're pulling your hair; but on the other, you realize that you hired Rob to make it good — and if it takes time to make it good, okay. You have to be critical of what you're doing, and you have to insist on reshooting your effects if they don't come out right. Today's audience sophistication in terms of special effects really demands that."

"There was a lot of work on *Twilight Zone*," Bottin concluded, "but no great technical achievements. Most of the basic techniques we'd already developed, and we used pretty much the same process on all the characters. But I'm proud of what we did in the amount of time we had. In two-and-a-half months, we built five mechanical puppets, and did the rabbit out of the hat and the girl with no mouth. And it was fun. I'll probably never get a chance to do that sort of thing again."

After Bottin's creations, a number of divergent effects cap off the Dante episode. First, Anthony wishes away the house and all its inhabitants, leaving himself and Helen Foley stranded in a strange echoing limbo. The "Nowhere" effect, shot on a fog-filled stage, consisted primarily of two slightly different takes of the same scene superimposed atop one another, eerily drifting in and out of sync.

Then Foley's automobile materializes. "The trickiest thing for us was to determine how to do the car resurrection without turning it into something that looked like a car commercial," commented Peter



Surrounded by members of his crew, each with a cable mechanism in hand, Bottin prepares to actuate yet another version of the cartoon creation for a low-angle closeup. This fifth and final manifestation, however, was ultimately cut from the film.



Matte artist Rocco Gioffre generated the segment's closing shot as the car carrying Anthony drives down a barren desert highway, flowers blooming magically in its wake. Only the car and strip of road were retained from the original background plate. To fill the rest of the frame, Gioffre rendered two paintings — one of the barren desert, and another of the same topography covered with flowers. The flowered painting was then introduced over the desert one through a combination lap dissolve and wipe. A sun flare and sparkling highlights were incorporated later to instill added life.

Kuran, whose Visual Concept Engineering was given the task. “Eventually, Ed Manning — working with rotoscope techniques on a flatbed animation stand — figured out a method. Basically, what it amounted to was a little wipe that starts on the car’s wheels, and then goes up and around the back of the vehicle — with a matte of sparkling animation following the wipe at the same time.”

The final “Good Life” effect occurs as Foley’s car drives through a blasted landscape, with flowers blooming magically in its wake. To accomplish the effect — rendered with latent image matte paintings at Dream Quest — matte artist Rocco Gioffre accompanied Dante and his camera crew out to a desert location near Palmdale. “We shot the matte plate with a wide-angle lens — at about six in the morning, because Joe wanted long shadows cast behind the car as it drove up the road. Then, when I did the painting, I threw away everything that was outside the perimeter of the road, changing the desert terrain to make it less hilly — which is what Joe had wanted in the first place. I also did a slight reduction within the live-action so that we could get an even wider angle than what we’d been able to shoot. The actual blooming of the flowers was done with a second painting. So there’s a matte painting of the desert, a matte painting of the flowers going out to the horizon, and a couple of slot-gag pieces of artwork representing other flowers that sparkle and twinkle. The flowers were brought in by the combination of a lap dissolve and a wipe, not unlike an old-fashioned Universal werewolf transformation. There’s a lightbulb in the painting that we added for a sunflare during a separate camera pass, and also some moving clouds, which are probably not too noticeable because everyone’s looking at the blooming flowers. The clouds were done pretty much the way Albert Whitlock does his — by matting the sky out while the locked-off portion of the painting is being shot, and then matting it back in in horizontal bands with soft blends and split-screens.”

With Helen Foley’s car driving off into the horizon, Dante’s episode draws to an upbeat close — a notable departure from its televised predecessor. It did, however, have a final twist at one point. “Originally the stories were in a different order, all linked together,” said John flora, “and ours was supposed to go before the Spielberg episode. So at the very end of Rocco’s matte painting, you were suddenly going to see scanning lines cut across the frame, and then you’d jump back and it would be on television in the old folks’ home. Then somebody would turn off the set and they’d say: Wasn’t that a good *Twilight Zone*?” “At yet another point, the segment was slated to conclude the film. “Because of that,” said Joe Dante, “I went up into the mountains with John on one of the two nights he was filming his prologue sequence, and we shot the original ending for the movie. Kathleen Quinlan was going to pick up a hitchhiker, who would turn out to be Danny Aykroyd, and he’d say, ‘Do you want to see something *really* scary?’”

As finally assembled, *Twilight Zone — The Movie* thunders to a rousing finale with George Miller’s recreation of the classic “*Nightmare at 20,000 Feet*.” Carrying the old William Shatner vehicle to new heights of hysteria, actor John Lithgow essays the role of Valentine, a computer textbook writer on a storm-tossed night flight, whose rabid fear of flying is further traumatized by the fact that only he seems able to see a large unearthly creature astride the airliner’s outboard engine, gleefully tearing it to pieces. Peppering his episode with numerous dolly, Steadicam and hand-held shots, Miller deftly transcends the natural tendency toward static aircraft interiors, imbuing the familiar tale with the same hyperkinetic frenzy that has become his acknowledged stock in trade in such virtuoso action films as *Mad Max* and *The Road Warrior*.

Easily the most spectacular segment of the film, “*Nightmare at 20,000 Feet*” also boasts the production’s most impressive set — a full reproduction of a Boeing 707 wing, complete with a section of fuselage. “When I first came on board the *Twilight Zone* film,” said James Spencer, art director for the episode, “the wing had already been more or less designed. So I was involved initially with facilitating and mounting it over a large tank on Stage 15. The wing itself was 82 feet long, made from plywood and fiberglass, with real engine housings obtained from a surplus house — no engines in them, though. The wing was mounted about six feet off the stage floor on a huge hinge, and was also supported in the middle and tip by air rams to make it rise and fall. The pit over which the wing was mounted was six feet deep, giving us twelve feet of clearance in all for the seven-foot movement. We blackened everything around the setup, including the pit, so our lightning flashes wouldn’t reflect.”

Although the main cabin set would be constructed elsewhere, a small ten-foot fuselage section, containing only three seats, was semi-attached to the wing. This enabled Lithgow to react within a real — although limited — environment, and also gave Miller the freedom to film simultaneously both Lithgow and the exterior wing action seen through his window. The main cabin interior was constructed in three breakaway sections, supported by springs and inner tubes to impart a sense of free-floating movement. One section also included an outer fuselage skin for an exterior scene in which the other passengers, unnerved by Valentine’s unorthodox behavior, peer anxiously out their windows. For the most part, the cabin interior was practically lit — with standard aircraft lighting fixtures over the seats built to house stage lights as well. Outside the window, cloud vapor and streaking beads of condensation were created by running nitrogen lines above and between each window. During photography, the nitrogen was blown by large exterior fans.

“Lighting that wing was a real problem,” Spencer continued. “Allen Daviau pulled off a miracle. There were a lot of overhead lights, plus some under the wings to give us the engine flashes and create shards of light — and hiding all that so you couldn’t see the sources was definitely a challenge. We had huge six-foot-diameter Ritter fans blowing all around, as well as rain machines and foggers. We also had four scissor arcs going off at different points around the set to simulate lightning. Mike Wood — whom I’d also worked with on *Poltergeist* — designed the wing movement and rigged the explosion effects for the scenes where the creature throws chunks of metal into the engine, which I thought was spectacular. First he mounted flashbulbs around the inner diameter of the engine; and then, for the residual effects, he included spark rigs inside the cowlings. Gas flame pipes were also set on the outboard side of the engine, but it was the flashbulbs that really made that effect — especially with the wind and smoke to carry and filter it.” Stock shots of the 707 itself flying through the storm were lifted from similar sequences in Universal’s *Airport*.

Spectacular though the wing set may have been, it is the strange, wildly exultant gremlin that occupies center stage throughout. Something of a cross between a gargoyle and a living corpse, the creature was constructed by Craig Reardon, who had assumed that his brief stint on the *Twilight Zone* prologue would be his only involvement in the film. “I was in Nashville bashing up Richard Thomas’ face for a TV movie about Hank Williams Jr., when I had a call forwarded to me from Dennis Jones, the *Twilight Zone* production manager, saying he wanted me to come talk about the George Miller ‘*Nightmare at 20,000 Feet*’ episode. I couldn’t have been more delighted, because that was always one of my favorites from the original series, and I knew that this meant they wanted me

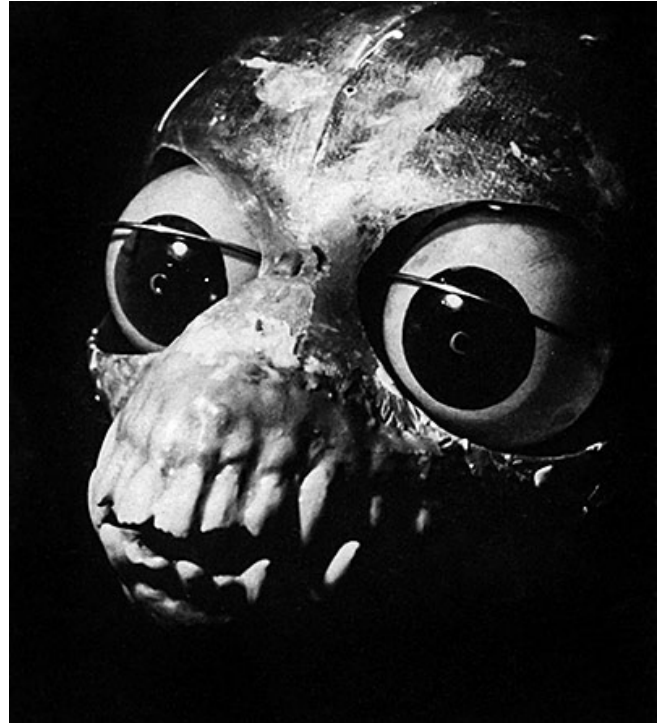
to work on the gremlin. When I got back to L.A., I met with George Miller and Ed Verreaux, who was doing the storyboards and conceptual art. George and Ed and Jim Bissell — the production designer — had already discussed quite thoroughly what they wanted the gremlin to look like, and they went at it with a sort of ‘form follows function’ approach. Ed, in particular, was spouting off ideas like popcorn: ‘Now, if this thing is able to fly, it would have to have this kind of structure so that it could cut through the wind. And maybe it would have suction cups along its feet and its hands so it could grasp the skin of an airplane without being blown off.’ George had a copy of David Attenborough’s book based on the *Life on Earth* TV series, and he had a favorite picture in there of a red-faced monkey — a nasty little beast with a very stern, mean-looking face — and George wanted the gremlin’s features to follow that slightly primate look. Since everyone had pretty well determined what they wanted this thing to look like, it was really just a matter of my taking the sketches in hand and going home and beginning to figure out how to do it.”



The wing-walking gremlin, featured prominently in George Miller’s remake of “Nightmare at 20,000 Feet,” was constructed by Craig Reardon and Michael McCracken. Though its foam rubber body was cast in an uncustomarily large, single piece, its hands, feet and head were generated separately and attached after the fact. McCracken’s son — also named Mike — lends a hand in the mold-making process.

Reardon's first step was to engage fellow sculptor and makeup artist Michael McCracken, with whom he had worked on *Poltergeist*. Next came the development of an overall approach. "What I decided for the creature was to do an entire body suit, sculpted from head to foot — not something put together in pieces. That way, we could really control the look of the thing. I further decided to make the entire costume out of foam rubber. I had been involved with movies where that had been done — most notably *Altered States*, where Dick Smith was in charge — so I knew it was possible. There are pitfalls to foam rubber, however. For one thing, it shrinks. But there are disadvantages and advantages to every material. The good thing about sponge rubber is that it takes an excellent impression. It completely reproduces everything you put into your original sculptures, and it is also extremely flexible. Some of the plastic foams and other things that don't shrink as much don't have the advantage of being as flexible and able to move as sponge rubber. So, even with its inherent disadvantages, I decided to use it."

A fiberglass mannequin, slightly larger — to accommodate shrinkage — than actor Larry Cedar who would be playing the gremlin, became the basic form over which the creature's vaguely reptilian body would be sculpted by Mike McCracken. Reardon, meanwhile, occupied himself with the hands and feet, which were done separately. "I ended up having to alter the original suction cup concept. When I first rendered typical suction cup shapes on the hands, the effect looked pretty corny — like something on a bathmat. So what I made instead were big fleshy-looking pads on the fingers and on the palm of the hand, similar to the foot of a crustacean. Everyone liked that approach. Unfortunately, there was never really an opportunity to see that in the finished film. Then we came to the creature's tail which Mike McCracken sculpted and cast in foam rubber — a nice seven-foot-long tail with a spade-shaped flattened end on it. I think that was rationalized on the basis that it would be used



The underskull of the gremlin, equipped with cable mechanisms for facial expression and gimbal-mounted rigs for unrestricted eye movement.



The completed gremlin suit, worn in the film by actor Larry Cedar.

something like a rudder for steering through the skies, and then as another suction device to anchor the creature to the wing upon alighting.”

Molds were made once sculpting on the major pieces was completed. “What I knew had been done in the past — and, for example, what Dick Smith did on *Altered States* — would be to break the molds up into separate pieces for the torso, legs, arms and so forth. Then the pieces would be put together later into a single suit. What I tried to do, though, was keep everything but the hands, feet and tail in one piece — so we were dealing with an immense piece. These were then placed in a drying booth, at about two hundred degrees, to cure the foam latex — which is standard. Makeup artists use this approach all the time for noses and faces. We were just using it for a much larger project.”

During the prolonged suit construction process, Reardon turned his attention to sculpting the head and devising the facial mechanisms. A number of people on the production staff had ongoing inputs to the head design — not the least of which was George Miller, a frequent visitor to Reardon’s workshop. “On one particular afternoon, George must have spent three or four hours just sitting in a director’s chair behind me, calmly smoking his pipe and making remarks. He’d reach over and say, ‘Do you mind awfully if I change this a little bit?’ And he’d resculpt a little piece. Almost every time he did, he made an improvement. George had good ideas. He’s really the most remarkable director I’ve ever worked with, in the sense of his enthusiasm and his desire to be involved.”

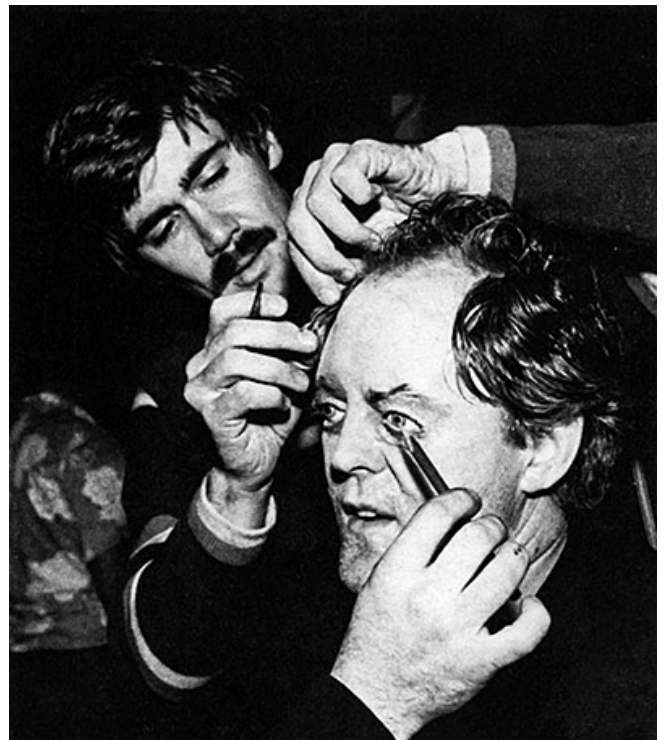
The basic skull structure, replete with recessed cavities and bony ridges, presented major difficulties when it came to pulling a mold. “I lost a lot of time on that at first,” said Reardon. “The way the thing was designed, the frontal bones not only cut into the head, but also sported cheekbone ridges that came out from there and up. As a result, the mold had about four directions in which it could become locked onto the sculpture. I had another unique problem in that I had to make the creature’s facial skin only about an eighth of an inch to maybe three-sixteenths of an inch thick. This was to make it mobile enough so it could be pulled into various expressions. But in riding over some of the extremely baroque and pronounced bone forms that were part of the creature’s look, the skin was not thick enough to relieve undercuts created in the mold. The final head mold wound up being in eight pieces. The basic form was done in four pieces, and then there were four little clip-on pieces inside to go into the vastly undercut areas, which could then be slipped out after the larger four-piece mold had been removed from the foam latex casting. That meant a lot of seams to deal with, but it was the only way I could figure out how to get that incredibly weird-shaped head out of the mold and then draw out a very thin skin.”

Generating the head shape was only part of the overall problem. Devising the actuating mechanisms was another altogether. "George wanted very large eyes. In fact, he was always miming what he wanted to me, opening his eyes as wide as he could get them and saying, 'This is what I want to see.' George also wanted the gremlin to be able to pull its lips back from its teeth, so you could see quite a bit of gum-line. He made a big point about that. In addition, he wanted it to be able to grin quite broadly, as well as blink and roll its eyes. So I saw to it that our gremlin could do all that. Unfortunately, though, with fast cutting and all the atmosphere blowing by, you really don't see much of the thing's small repertoire of expressions. You *do* see a little bit of the smile blooming at the end, but the blinks and eye rolls are pretty much lost. In any event, putting that all together consumed a fair amount of time.

"The facial expressions were done in a push-pull manner, which is a lot more reliable and quicker than some of the more complicated methods. The push-pull mechanisms were basically radio-control model airplane cables, which come in two or three diameters. I used some very thin ones to do the pulling, and some slightly thicker ones for the push-pull work, such as moving the eyes. The eyes themselves were placed on a gimbal rig, so that they could not only look up and down, but around as well. I agonized over that for a long time until the idea came to me when I was getting up one morning. So I did a quick little sketch on a Kleenex box, which I took out to the shop — and it worked! At first, Larry Cedar was able to see out of the mask through the creature's transparent eyes — rather inadequately, I must admit — but as soon as he began to breathe, his breath would condense on the backs of the plastic eyeballs, and pretty soon he was blind. So for long shots, we installed a special pin that would allow the eye apparatus to lift right out of the mask. From a distance, it was impossible to tell that the eyes weren't there, and Larry could then look out through the open holes. For closer shots, of



With great exuberance, the gremlin does its destructive best to down the storm-tossed airliner.



For a momentary shot when Valentine first sees the creature outside his window, Miller wanted the terrified passenger's eyes to pop out. To accomplish the almost

course, the eyes were put back in.” As a final detail, Reardon installed tiny red grain-of-wheat bulbs into the inner temples of the creature’s head, near the occipital ridges. In the dark, they gave a slight glowing quality to the eyes. The subtle detail was obscured, however, in the maelstrom of storm effects employed during principal photography.

imperceptible effect. Craig Reardon prepared an appliance to cover actor John Lithgow’s eyes and forehead, very beginning of the take, considerable on-set amusement was derived from a number of rather exaggerated inflations.

One of the creature’s most distinctive characteristics is the great cascade of quills sprouting from its skull. “Ed Verreaux was the one who came up with the idea of quills coming up from the top of the creature’s head and falling all the way down its back like an Indian headdress. I’m not really sure what the rationale was, except that they seemed to be an interesting alternative to hair. It certainly looked marvelous when the wind started to blow; and from a practical point of view, they proved to be quite useful. For one thing, they helped us conceal the zipper down the back, which is the usual bane of any monster costume. Also, we were able to take our actuating cables out the back of the head and lead them down through the forest of quills, which was good camouflage. In terms of construction, though, the quills were really tough to figure out. The idea was that they had to look like great sheaves of wheat blowing and rattling together like porcupine quills. I came up with a lot of possible solutions — including using shafts of feathers — before I finally hit upon the idea of using eighth-inch nylon airhose, which was available from a local supplier. I ordered rolls and rolls of that stuff, and cut it into three-foot lengths, which then had to be hung out in the heat booth to loosen up some of the tight curl acquired from being in a roll. An amusing footnote to the whole quill business is that I actually drafted my mother in to apply them — a hard job, which she not only figured out how to do, but also arduously completed herself. She’d start by taking an ice pick and sticking it into the costume. Then she’d put a couple drops of cyano acrylate — otherwise known as Super Jet adhesive — on the end of one of the pieces of tubing. Then she’d jam it into the hole that the icepick had made, pull the pick out, and — presto — the quill would stay there. I’d had nightmares trying to figure out how to keep these things stuck to the costume, because the foam in some places was only a quarter-inch thick — but those quills held on famously. We only lost maybe a third of them through molting.”

The gremlin’s preliminary coloration consisted primarily of sandy, lizard-like hues; but after examination, George Miller opted instead for light beige tones — not unlike the color of natural foam rubber. “I managed to get the whole costume spray-painted just a day or so before it was needed on the set,” said Reardon, “which was unfortunate, because the kind of paint you use for foam rubber — which is basically just rubber cement with universal colorant — is much better and more durable if you give it time to mature and cure. But with only four-and-a-half weeks from start to finish, we didn’t have that luxury. I had to go virtually right to the set with the costume. Unfortunately, this basic problem was compounded by another. From our initial discussions, we had not figured on having a lot of direct water on the costume. Instead, the idea was to have the creature surrounded by an envelope of dry atmosphere, with the rain being blown to the camera side of him or beyond him. But once George saw a test, and he saw the thing dripping wet, he said, ‘Well, we’ve got to do it.’ From that point on, it was firehoses and Ritter fans just soaking this suit every time you saw it. And, of course, the costume immediately took on water, just like a bath sponge. In fact, it was absolutely saturated with cold water the entire time Larry Cedar had to work

in it. At any rate, the skin color originally had some rather beautiful undertones of blue and pink, and there was also some superficial detailing, including a network of little veins and things. But once the gremlin began taking a bath in that incessant rain, the paint began to go south on me. Certain colors began to leach through. Blues that had been used for some of the shadowing would suddenly come up through the paint film almost like dye. It was awful — absolutely ghastly what was happening to that suit. But George kept his calm completely, and said not to be concerned about it. Fortunately, the scenes where the gremlin finally grapples with John were scheduled first, so the costume would look its best, and by the time the suit was starting to look really leprous, George had finished all but one of the closeups.” Even in its deteriorated state, the costume proved perfectly adequate for the remaining long shots. The missing closeup, however, was a critical one — a jarring cut to the creature staring in through the window as Valentine draws back the shield. “That was supposed to be our very first shot,” said Reardon, “but I couldn’t get the suit ready in time. As it turned out, it became the last shot we did with the costume. I was very lucky that the gremlin was still in good enough shape to tolerate a closeup like that. Fortunately, George was a great K-Y lubricant fan, and he smeared great globby handfuls of it on the mask for any of the closeups — which relieved any minor chafing that may have been on the mask.” During the closeups, Reardon himself activated the cable mechanisms, assisted by Bruce Kasson, one of the prop men.



Larry Cedar atop the segment’s major set piece, a fiberglass and plywood replica of a Boeing 707 wing. To allow for several feet of vertical movement physical effects supervisor Mike Wood designed elevating air ram mechanisms which attached to the center and tip of the hinged wing. A wire rig, attached to Cedar, imparted an unnatural sense of fleetness and agility — and also doubled as a safety device.

To impart an almost supernatural sense of lightness and agility, Miller decided to suspend his creature-clad actor from an overhead wire rig. Even with a flying harness under his costume, however, Larry Cedar was able to suit up fully in only thirty minutes. And indeed, the wire rig did enable him to move about on the wing with unnatural fleetness and grace. There was a practical rationale, as well. “He was tethered, also,” said Jim Spencer, “because that wing moved rather violently, especially when he was on the engine pod throwing things in there with the explosions and whatnot. Even then, with all the water and oil, it was pretty slippery up there. So we had mattresses below, all covered in black, just in case he fell.”

As it turned out, Craig Reardon’s involvement in the segment was not limited solely to the creature. “George uses things in an interesting, fragmented way, knowing that the human brain has the capacity to absorb things in a very short amount of time.

When John Lithgow first sees the creature at the window, George wanted his eyes to bulge out of his head. And I said, ‘What exactly do you mean, George?’ He replied: ‘I want his eyes to pop right out of his head — I’ll only use about six frames of it. Can you do that for me?’ Apparently, he’d done something similar in *Mad Max* — for a shot of a guy who’s about to impact violently with a vehicle. So we tried it. There wasn’t time to do it properly using a false head, so instead I built an appliance that went over John’s eyes, with rubber eyelids and eyeballs, and false eyebrows. Actually, it was pretty unconvincing, if scrutinized, because it had to be made *from* his face to cover his face, unavoidably building it out so that it looked like he had Down’s Syndrome. But it was good enough for six frames. Then we shot about fourteen different takes, pumping the eyes up like balloons, using tubes that ran back and over his ears and through his tousled hair to a couple of large enema syringes. It was hilarious, really. And George didn’t just want them to come out half an inch — they had to come out two and three inches! On several takes, the eyes got as big as baseballs! People were dying of laughter on the set, and pretty soon it was all John could do to keep a straight face as he was screaming in terror. But George’s intention was to just take a snippet of that, and cut it briefly in



During the shoot, fog, wind and rain effects were employed in great abundance.



Kevin Kutchaver, of Visual Concept Engineering, did a hand-animated lightning strike on the creature, shot on tow contrast black-and-white film for maximum detail.

between the quick shots of the creature in the window, which is what he did — although when I first saw the film, even I couldn't tell for sure."

Maddened with fear, Valentine grabs a pistol from a sky marshal and shoots at the creature, shattering his cabin window, and nearly getting sucked out in the ensuing decompression. "Another piece of the jetliner fuselage was used for the shot where Lithgow gets pulled across the cabin," Spencer recalled "We leaned the set at about a 45-degree angle and used a stuntman. It was a pretty tight cut, and he just bounced off a small trampoline and dove for the window. We had also planned to hang the fuselage at a 45-degree angle for the sequence where Lithgow gets sucked out of the window. That way, gravity could have played a part in it. But because of the hassle of all that — of getting John in and out of a very uncomfortable position, especially after all he'd already been through — we scrapped that idea. Instead, we put the fuselage on the ground, and built a ramp inside the plane for John to lie on — dangling halfway out the window as he tries to shoot." In a gesture of utter disdain for the weapon being brandished at it, the creature walks right up and bites off the barrel. The gobbled gun was another bit of Craig Reardon's handiwork. Starting with a mold taken from a real revolver, Reardon cast a lightweight replica from high-density polyurethane foam, precut into pieces so the costumed Larry Cedar could bite it in half without difficulty. "The jaws were hinged," said Reardon, "but we couldn't get a whole lot of leverage with them, so the gun had to be already segmented. Even so, it was tricky getting that bite on film — mainly because Larry, in his costume, wasn't able to see it very well. And John couldn't very well help by sticking it in his mouth, because he was supposed to be recoiling. It took us quite a while to get it right."

Still grappling with Valentine, the gremlin suddenly looks out over the wing to see the plunging airliner only moments away from an onrushing airport runway — a multilayered effects shot pieced together from scratch by Jim Danforth and his Effects Associates team. "My understanding from the storyboards," said Danforth, "was that the POV would begin above the cloud layer and then dive through the clouds and emerge on the other side where the runway would be visible below. In point of fact, what they *really* wanted was not to be above the clouds at all, but rather *inside* the clouds, because most of what preceded it took place in sort of a limbo fog environment. At that point, though, I hadn't seen a rough-cut or anything, so I ended up doing what was actually a very interesting, but quite unnecessary, piece of film — a moonlit night sky above the cloud layer with the camera then going into an enormous cumulus cloud before we dissolved through that to the runway shot. So we had to dump the first part and start in the clouds, which then part and we see the wing of the airplane in the bottom of the frame. Below is the runway, and beyond that are some silhouette mountains, with drifting layers of multiplane clouds in between — a lot of elements. Plus the plane was supposed to be rocking, which meant that because the camera's on the wing, the wing appears to be stationary, with the view beyond it pivoting back and forth.

"Mark Sullivan did an enormous painting of the runway and city lights on a four-and-a-half by six-foot sheet of glass — done in orthographic perspective as though you were looking straight down on it, like a map. We put that up on its side and trucked past the painting with our camera also mounted sideways to get the same point of view



you'd get by actually suspending a camera over the painting — only a lot easier. In a real-life situation, of course, the ground closest to the camera would seem to be moving by very fast, while distant mountains and things would appear virtually stationary. To duplicate this perspective shift, we moved over the painting with a 20mm lens — very close, and at an oblique angle. To accentuate it even further, I did a smaller painting of the distant mountains and sky — which, from a photographic point of view, are at infinity — and we split-screened the two together so the top part of the frame didn't move at all. The soft blend wasn't a hundred percent effective, but that's where our clouds became an asset. By positioning them carefully, we were able to break up the blend area so that you never really got a good look at where the moving and non-moving paintings went together."

The background is a painting of a landscape with mountains and sky, shot in the foreground by a 20mm lens. The foreground is a painting of a landscape with mountains and sky, shot in the foreground by a 20mm lens. The foreground is a painting of a landscape with mountains and sky, shot in the foreground by a 20mm lens.

After a failed attempt to generate suitable cloud elements with live smoke, Danforth opted instead for an old effects standard. "We ended up doing the clouds with small puffs of cotton and simply shot them against black, trucking in on them at different speeds to get the effect of different layers. Two of those layers were duped together and matted over the ground painting. The wing was a fiberglass miniature that we shot as a front- and backlight matte, and we bipacked that in the matte camera so the wing would remain stationary in the frame, even though we were tilting the camera. This entire composite was put together on my rear projection setup. We made some early tests on the optical printer, but found that we actually got better repeatability control by doing it with projection because we could use multiple projectors and not have to repeat as many passes. So we had the matte for the clouds running in bipack with the ground painting element; and then we had the burn-in of the clouds on a separate projector, and we very carefully sized those so they fit together with no lines. Then we rephotographed that with the taking camera rocking back and forth. Later we had to go back and add an overall haze. Of course, all this happens in an eye-blink. It's just an impression, really. But it's the kind of thing that if you do it wrong, it's pretty obvious."

Thwarted, the creature turns, smiles, and waggles an admonishing finger at Valentine before taking off in a beautiful spiraling roll up into the clouds. The flamboyant corkscrew takeoff was a stop-motion cut, the only such shot in the film. Working from Ed Verreaux's storyboards, animator David Allen first prepared a background plate by filming clouds drifting over Los Angeles' Griffith Park with a Mitchell NC camera. This footage, shot in reverse, was then skipframed every third frame, and further doctored with thunderbolts, interactive lighting effects and a slight optical zoom-out. The next step lay in preparing the stop-motion puppet, a collaborative effort between Allen and his associate, Dennis Gordon. "The puppet was about six inches tall," Allen explained, "constructed of the standard foam rubber material over an armature built for me back in the early Seventies by Jon Berg. We worked from a number of photos of the full-size suit, with Dennis basically blocking the puppet in and I finishing it. Actually, it was a pretty good match. It even had about three hundred little silver-painted wires that Dennis pushed into it for quills, as well as small flying squirrel-type wings under each arm."

Mounting the puppet on a blue-painted rod attached to a rotating mechanism, Allen animated the figure against a small blue screen, plotting its trajectory on a card behind the camera by using a

projected crosshair which traced the arc of the flight. Since the creature had to accelerate rapidly through the shot, Allen manually incorporated motion blurs into each stop-motion frame through a coordinated combination of puppet movements on the rotator, plus pans and tilts — even dolly moves — on the camera. The complex shot required three full takes to perfect, each requiring an arduous eight hours of animation. Next, Van der Veer Photo Effects composited the puppet footage with the cloud plate. Then Allen reduped the shot through a fog filter, incorporating smoke effects and camera shake — achieving, in the end, a finished composite which gives very little hint at being a miniature effect.

The gremlin vanquished, Lithgow and his co-passengers find themselves deposited safely on solid ground. A wrap-up sequence in which the ground crew discovers physical evidence of the creature's assault was filmed at Van Nuys Airport, employing an actual 707. "We dressed the plane by dismantling one engine and adding our own cowling," said Jim Spencer, "which was ripped apart and smeared with molasses to suggest engine oil. I also applied gouges around the wing, as if the creature had torn the engine up. To do that, I wrapped some thin-gauge lead around the fuselage and scored it with a large steel-clawed hand, so that it would rip apart just like it actually would if someone had the strength to do it."

The episode — and the film — were nearing completion. Only a final punchline remained. As the hapless Valentine is whisked away in an ambulance, the driver turns to reveal the same Dan Aykroyd character who opened the film. After subjecting his near-catatonic patient to some mindless chatter, Aykroyd cheerfully inquires if he'd like to see something *really* scary. Curiously, the crowd-pleasing epilogue grew out of the late decision to place "*Nightmare at 20,000 Feet*" last in the film, and since George Miller had already returned to Australia, Joe Dante was called upon to do the short pick-up scene.

On June 11, 1983, *Twilight Zone — The Movie* was given a special premiere in Binghamton, New York — Rod Serling's home town. In attendance were a number of original *Twilight Zone* alumni — actors, writers, even the real Helen Foley. It seemed a fitting tribute. In perhaps the most literal way possible, four of the Finest young talents in motion pictures had spanned the years, offering thanks and paying homage to an American original whose weekly forum of fantasy had indelibly shaped and influenced so many later merchants of the imagination.

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